Why Euro Area National Central Banks' balance sheets matter

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Declaration

I wish to declare that no part of this doctoral thesis contains material previously submitted to the University of London or to any other university or institution for any degree.

The fourth chapter of this thesis, titled 'The True Size of the Eurosystem: New Insights from the Euro Area National Central Banks' Balance Sheets' is a joint work with Prof. Stephen Wright. Most of the hard work on this front, and indeed on the Chapter as a whole, was carried out by myself.

All the other work presented in the thesis is my own.

Charmaine Portelli
London, United Kingdom

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Abstract

The aim of this thesis is to contribute to the new field of monetary policy analysis – the analysis of central banks' balance sheets. Within this field, this thesis conducts an analysis of the balance sheets of the national central banks operating within the Eurosystem, the literature on which so far has remained scarce. Through various investigations, this thesis argues that the Euro Area National Central Banks' (EANCB) balance sheets do matter because they have the power to reveal facts that are obscured in the aggregate Eurosystem balance sheet.

Focusing specifically on the Eurosystem, this thesis provides a new dataset - a breakdown of the balance sheets of all NCBs within the Eurosystem covering the 2006-2016 period. Based on this dataset, this thesis, firstly, compiles a gross balance sheet of the Eurosystem, which does not consolidate intra-Eurosystem transactions. This new measure, however, presents a paradox, which though it remains unresolved, motivates an examination of the relationship between the EANCBs, the ECB and the Eurosystem, leading to the identification of interesting insights.

This thesis establishes that the size of most of the EANCBs' balance sheets are strongly correlated with the size of their share in the ECB capital and this relationship is even stronger when the gross balance sheet of the Eurosystem is used. Other evidence is found supporting the notion that the EANCBs more or less run on autopilot – in line with shares in the paid-up equity in the ECB. An econometric analysis is also carried out confirming this behaviour of the EANCBs.

This thesis also conducts a detailed comparative analysis of developments in the composition of the EANCBs' balance sheets. A new framework is proposed that treats the balance sheets exhaustively, including the intra-Eurosystem transactions between EANCBs – in contrast with a framework already in the literature, Pattipeilohy (2016). Through this new framework, a comparative analysis is conducted on the typology of the EANCBs over the 2006-2016 period.

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Abbreviations and Acronyms

ABSPP	Asset-Backed Securities Purchase Programme
ACK	Adjusted Capital Key
AIC	Akaike Information Criteria
APP	Asset Purchase Programme
ARDL	Autoregressive Distributed Lag Model
ATA	Actual Total Assets
BB	Bankers' Bank
BDM	Bankers for Domestic Counterparties
BIC	Schwarz Bayesian Information Criteria
BN	Banknotes in circulation
BoE	Bank of England
CBPP	Covered Bond Purchase Programme
CLAC	Conventional Loss Absorption Capacity
CSPP	Corporate Sector Purchase Programme
DAH	Domestic Assets Holder
EA	Euro Area
EANCB	Euro Area National Central Bank
EAPP	Expanded Asset Purchase Programme
ECB	European Central Bank
ECM	Error Correction Model
ES	Eurosystem
ESCB	European System of Central Banks
ESTA	Eurosystem Total Assets
FC	Foreign Currency
FE	Fixed Effects Estimator
FEANCB	Framework for Euro Area National Central Banks
FRB	Federal Reserve Banks
FRFA	Fixed Rate Full Allotment
FRS	Federal Reserve System
FTRO	Fine-tuning Reverse Operations
FXH	Foreign Exchange Holder
GB	Government's Banker
GDP	Gross Domestic Product
IEB	Intra-Eurosystem Borrower
IEL	Intra-Eurosystem Lender
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IPSAS	International Public Sector Accounting Standards
ITA	Implied Total Assets
LR	Likelihood Ratio
LTRO	Long-Term Refinancing Operations
MG	Mean Group Estimator
ML	Maximum Likelihood

MLF	Marginal Lending Facility
MRO	Main Refinancing Operations
NCB	National Central Bank
NI	Note Issuer
PF	Pattipeilohy's Framework
POLS	Pooled Ordinary Least Squares
PSL	Private Sector Lender
PSPP	Public Sector Purchase Programme
QE	Quantitative Easing
SDR	Special Drawing Rights
SE	Standard Errors
SMP	Securities Market Programme
SOA	Speed of Adjustment
T2	Target2
Target	Trans-European Automated Real-time Gross Settlement Express Transfer System
TH	Treasury Holder
VAR	Vector Autoregressive Models
WGA	Whole of Government Accounts

Conventions used

bn	Billions
m	Millions
_	Nil, non-existence of the event considered or insignificant
0.0	Less than half the final digit shown and greater than real zero

List of Countries

Countries are listed using the alphabetical order of the country names in English.

Euro Area Member States (as at end 2016)	*EA*	*Non-Euro Area Member States (as at end 2016)*	*NEA*
Austria	AT	Bulgaria	BG
Belgium	BE	Croatia	HR
Cyprus	CY	Czech Republic	CZ
Estonia	EE	Denmark	DK
Finland	FI	Hungary	HU
France	FR	Poland	PL
Germany	DE	Romania	RO
Greece	GR	Sweden	SE
Ireland	IE	United Kingdom	UK
Italy	IT		
Latvia	LV		
Lithuania	LT		
Luxembourg	LU		
Malta	MT		
Netherlands	NL		
Portugal	PT		
Slovakia	SK		
Slovenia	SI		
Spain	ES		

Chapter 1

Introduction

Before the global financial crisis, within contemporary central bank operating frameworks – despite the differences in their economic and financial structures and central banking traditions across jurisdictions – monetary authorities primarily pursued their mandates through the setting of an operational target for a short-term interest rate. Within such frameworks, the balance sheet of the central bank played a subordinate role. With the advent of the financial crisis, however, central banks around the world moved beyond their traditional operating frameworks, using their balance sheets to perform a variety of interventions, altering their size and composition to varying degrees. Thus, the appropriate degree of monetary accommodation called for more active management of the size and composition of central bank balance sheet assets rather than the relatively more passive approach adopted prior to the financial crisis, whereby liquidity provision was demand driven with limited scope to affect broad financial conditions. This has led to the evolution of the use of central bank balance sheets as a flexible instrument of monetary policy - becoming an integral part of the central banks' toolkit.

Since the beginning of the financial crisis in 2007, the most obvious development in the central bank balance sheets has been an increase in their size. Indeed, at their respective peaks[1], the balance sheets of central banks like the Federal Reserve and the Bank of England had more than quadrupled while the Eurosystem's balance sheet

[1] At their respective peaks, the Bank of England's balance sheet had grown by 398 per cent (Nov 2012), the Eurosystem's had grown by 196 per cent (Dec 2017) and the Fed's had grown by 421 per cent (Jan 2015).

had more than doubled. This subject has been extensively dealt with in the literature and it emerged clearly that what happened during the financial crisis was not merely a 'doubling' of what had gone on before but a transformation of their traditional dynamics, compared to normal times. For this reason, central bank balance sheet analysis and the examination of the components of their balance sheets has – without any doubt – become crucial for these "main" central banks such as the Federal Reserve and the Bank of England, which operate on the basis of their own monetary policy framework.

There is a noteworthy peculiarity with the balance sheets of the Federal Reserve System and the Eurosystem – these are balance sheets of decentralised systems, which are composed of the balance sheets of the US Federal Reserve Banks and of the National Central Banks within the Euro Area, plus the ECB, respectively. This peculiarity has, so far, been rather ignored in the literature.

Focusing particularly on the Eurosystem, it consists now of nineteen Euro Area National Central Banks (EANCBs) plus the ECB. The EANCBs are separate legal entities owned by their national governments and publish their own balance sheets, while the ECB is, as Heinsohn and Steiger (2002) puts it, 'only the torso of a central bank'. Put differently, the Eurosystem consists of the ECB's balance sheet (which is relatively tiny) together with the individual balance sheets of the national central banks within the Euro Area.

While the balance sheets of 'main' central banks, as noted above, had a crucial role in the setting of monetary policy in times of crisis, the balance sheets of the individual national central banks serve an additional purpose – they contain information on the relationships between the national central banks as well as between each EANCB and the Eurosystem. This is the main motivation for this thesis.

The aim of this thesis is to investigate the factors that have shaped the development of the Eurosystem by examining the evolution of each of the EANCBs' balance sheets.

In other words, through balance sheet analysis applied to the Euro Area National Central Banks, the relationships between the EANCBs, the ECB and the Eurosystem are identified, in turn, shedding new insights on what was happening in the Eurosystem – insights that remain unrevealed if one looks merely at the balance sheet of the Eurosystem as whole.

The analysis in this thesis starts, in Chapter 2, by conducting a review of the literature related to various themes that are interlinked to the balance sheets of "main" central banks such as the Federal Reserve, the Bank of England and the Eurosystem – themes which are either applicable to or help in creating a contrast with regional or national central banks. Chapter 2 concludes by reviewing the very scarce literature that pertains to the balance sheets of Euro Area national central banks, detailing the gaps left unanswered.

Chapter 3 provides a new dataset – a detailed breakdown of the balance sheets of all NCBs within the Eurosystem covering eleven years to 2016. While this data collection lays the groundwork for my own investigations, it is in itself a contribution to knowledge as it offers scope for use in a wide range of other empirical investigations.

The three chapters that follow address distinct questions on the inter-relationships between the Eurosystem, the EANCBs and the ECB. Chapter 4 compiles a gross balance sheet of the Eurosystem through a simple amalgamation of the nineteen individual EANCBs' and the ECB's balance sheet, which, in contrast to the official balance sheet published by the ECB, does not net intra-Eurosystem transactions. Determining the 'true size' of the Eurosystem gives rise to a paradoxical issue which, though it remains unresolved, motivates an examination of the relationship between the EANCBs, the ECB and the Eurosystem, leading to the identification of interesting observations. This chapter also compares the relationship of the EANCBs vis-à-vis the Eurosystem with that between the Federal Reserve Banks and the Federal Reserve System. Chapter 5 estimates dynamic models that determine the rate at which EANCBs adjust their total assets towards the level that reflects their share in the ECB

capital. Moreover, this Chapter provides insights into the behavior of EANCBs with respect to their balance sheet and to what degree this is implicitly controlled by the ECB. Chapter 6 conducts a detailed comparative analysis of developments in both the size and the composition of the balance sheets of the EANCBs by proposing a new framework building on the one presented by Pattipeilohy (2016). While the latter was designed for "main" central banks such as the Bank of England, the Fed and the Eurosystem, the alternative framework was designed to account for the position of each EANCB vis-à-vis the rest of the central banks within the system. As Pattipeilohy's Framework allows for particular focus on domestic assets, some validity is identified in applying it to the EANCBs, despite that its application does not treat the EANCBs' balance sheets exhaustively. Chapter 7 concludes with a synthesis of the main findings and suggestions for further research. The Appendices provide the complete dataset, details on the methodological approach adopted in the analysis presented in Chapter 6 as well as other detailed data related to different aspects analyzed in this thesis.

Chapter 2

Literature Review

As noted by Rule (2015), 'the balance sheet of the central bank is critical to everything the central bank does'. Indeed, the structure and evolution of a central bank's balance sheet is a crucial tool in understanding the policy goals that the central banks aim to achieve and its effectiveness in doing so. Nevertheless, in the years leading to the beginning of the recent financial crisis, as quantitative monetary targets (such as targeting specific narrow measures of money) were being replaced by policy interest rates or inflation targets, interest in the central bank's balance sheet waned. The financial crisis, however, revived interest in the central bank's balance sheet as both the initial crisis response and the subsequent implementation of unconventional monetary policy, led to significant increases in the size of the balance sheets of "main" central banks. Indeed, as Bagus and Schiml (2009) highlighted, recent developments in monetary policy demand new analytical tools, in particular an analysis of central banks' balance sheets.

Despite that the central bank's balance sheet plays a critical role in the functioning of an economy, the theory of balance sheet analysis has been widely neglected in economic theory, in contrast with balance sheet analysis in business which is an established research field and a practice conducted by many observers. The central bank's balance sheet is important as its main liabilities – banknotes and commercial bank reserves – provide the ultimate means of settlement for transactions. As noted by Rule (2015), central banks exploit this role when achieving their policy goals by adjusting both access to such liabilities and their availability. On the asset side, assets

represent the means that the central bank can use to defend the price of its currency internally and externally through sales against its liabilities. Also, as demonstrated during the recent financial crisis, the assets can be used in policies to support a struggling financial system and inject confidence into it. Indeed, as Bagus and Howden (2009) noted, in times when traditional tools to analyse monetary policy become limited, such as when reaching the zero-lower bound on interest rates, an analysis of the quality of the assets held by a central bank becomes increasingly important. In sum, as Bholat and Darbyshire (2016) noted, central bank financial statements, particularly the balance sheet, are important because they reflect major policy intervention.

The question why central bank balance sheet matters requires a vast answer since it touches upon a wide range of themes, which, despite being different, are all interlinked to the balance sheet. For this reason, the existing literature on the central banks' balance sheets is vast. On the other hand, there is very sparse literature on the balance sheets of central banks that operate within a system of central banks such as the EANCBs. Despite the fact that the subject matter of this thesis is the latter, since the principles pertaining to the balance sheets of "main" central banks are either applicable to or help in creating a contrast with regional or national central banks, this Chapter is deliberately designed to start with a review of the literature related to "main" central banks such as the Federal Reserve and the Bank of England. The first part of this Chapter organises the related literature under different themes starting from the historical power of the central bank balance sheets and moving on to their role in macroeconomics, in signalling risk and in responding to the crisis, their financial strength and their composition. While providing a review of the ongoing debates or conclusions reached on these themes related to the balance sheets of "main" central banks, it provides the right context for the studies on the EANCBs presented in this thesis.

As noted earlier, in conducting this review, it immediately emerges that there is a clear gap in the literature – studies pertaining to the balance sheets of Euro Area

National Central Banks are very scarce and cover only specific aspects of the balance sheet, namely Target2, Euro banknotes and reserves. The second part of this Chapter reviews this limited literature. An appraisal of the gaps to which this thesis provides a contribution – particularly the role of the balance sheet to determine the relationship between the EANCBs, the ECB and the Eurosystem – concludes this Chapter.

2.1 Why Central Banks' Balance Sheets Matter: Brief Literature Review

2.1.1 The Historical Power of Central Banks' Balance Sheets

Central bank balance sheets have historically played a special role in ensuring monetary and financial stability. From very early on, central banks were entrusted with the responsibility of issuing notes and were recognized as credible lenders of last resort. During the Gold Standard period, central banks were crucial to preserving the integrity of the international monetary system. Indeed, the severe financial crisis in the US in 1907 led the US Congress to establish the Federal Reserve System, allowing the Fed to use its balance sheet to promote a currency that would be flexible enough to meet the needs of a growing economy. Despite this, there were also periods characterized by failure of major central banks such as in the 1930s, when it has been argued that central banks failed to use their balance sheets sufficiently to lower long-term rates and to halt a series of bankruptcies (Caruana, 2011).

During periods characterized by stability and economic prosperity, however, interest in central bank's balance sheet diminished in many economies as well as in the literature, particularly as central banks moved away from pursuing quantitative monetary policy targets and towards price targets in the late 1980s and early 1990s. This waning of interest in central bank balance sheet was intensified by what happened in the late 1990s when the policy focus of most central banks in advanced economies was, almost exclusively, on policy interest rates. This was the period labelled the 'Great Moderation', when balance sheets took a back seat in the formulation of monetary policy, despite that they still played an important

operational role in the implementation of monetary policy. However, this was changed, firstly by the financial crisis in Japan in the 1990s, the Asian financial crisis in the 1997/1998 and subsequently during the recent financial crisis. These two major shocks induced the revival of policy focus on central bank balance sheets.

2.1.2 The Role of Central Banks' Balance Sheets in Macroeconomics

The size and structure of central bank balance sheets can signal potential macroeconomic imbalances and growing risks across the financial system. Notwithstanding this, as noted by Filardo and Yetman (2011), within most of the benchmark macroeconomic models used in recent years, central bank balance sheets played no role. This may have been considered as a reasonable simplification as monetary policy was centred on a paradigm in which policymakers set short-term interest rates while the limited size and stable composition of central bank balance sheets tended to be passive. Recent events, however, posed a challenge to the canonical model as central bank balance sheets grew rapidly and their composition changed, in part reflecting extraordinary policy actions. This, in addition to the fact that changes in central bank balance sheets have had important macroeconomic effects, brought about renewed interest. Indeed, progress has been reported in introducing central bank balance sheets into conventional monetary policy models – presenting new analytical frameworks that provide a meaningful role for central bank balance sheets.

Various studies proposed different approaches to incorporate a role for central bank balance sheets in standard models used for policy analysis. For example, Durré and Pill (2010) suggested a model based on the inter-relationship between inflation and fiscal policy - a model that is built on the fiscal theory of the price level (Woodford 1995). An alternative means to ensure that central bank balance sheets play an important role is to assume that other economic actors face leverage constraints as suggested by Bernanke, Gertler and Gilchrist (1999) and Woodford (2011).

In sum, many economists agree that central bank balance sheets may, in principle, play a significant role in the economy and reveal important insights about monetary policy. However, as the standard macroeconomic models fail to incorporate the role of central bank balance sheets, literature has turned its focus on developing models that depart from the standard model and allow for analysing the effects of extraordinary policies and the macroeconomic risks and policy challenges posed by large balance sheets.

2.1.3 The Central Bank's Balance Sheet and its Financial Strength

One point which is taking centre stage in the recent literature on the central banks' balance sheet concerns the financial strength of the central bank as captured by its net worth[2]. As noted by Cukierman (2011), the issue of central bank capital and the distribution of profits appears, at first glance, similar to concerns of private corporations. However, as Rule (2015) noted, unlike with private financial institutions, central banks are not subject to regulatory capital requirements. Since central banks are usually owned by the state, the decision of how much capital a central bank holds is typically a question of political economy rather than purely finance. Indeed, as noted by former Bank of Japan Governor Fukui (2003), there is consensus that central banks' concerns with the soundness of their own capital base are typically focused on 'political economic instincts,' rather than just purely economic reasons. As a result, capital buffers typically vary significantly among central banks.

Theoretically, central banks can operate even when capital is negative – a central bank can issue liabilities regardless of its net worth and since it is part of the government, it is reasonable to consolidate the central bank's balance sheet with the government's broader balance sheet (Cecchetti and Schoenholtz 2015). However, Schoenmaker (2000) argued that the balance sheet of a central bank, like that of any other business in the monetary economy, has to consist not only of assets and liabilities but also of a

[2] An investigation of the net worth of each of the EANCBs is presented in Chapter 4.

surplus of the former over the latter. With this capital or equity it safeguards itself against the threat of bankruptcy. With these contrasting views, there is no consensus in the literature as to whether a central bank needs capital.

Some of the literature argues that a strong central bank balance sheet position helps underpin public confidence in the central bank's operational independence and commitment to fulfilling its mission and objectives, uninfluenced by their political masters. For example, Adler, Castro and Tovar (2012) used linear and nonlinear techniques on a sample of 41 countries and found that central bank financial strength can be a statistically significant factor explaining large negative interest rate deviations from an estimated 'optimal' level used as a proxy measure of monetary policy constraints. Stella (2011) found that inflation in central banks with weak financial positions is on average more than twice as high as for those central banks with stronger financial positions.

Other authors such as Perera, Ralston and Wickramanayake (2013) also concluded that the financial health of a central bank's balance sheet is a prerequisite for desirable policy outcomes. Indeed, their analysis, which covered a cross-section of countries, found a statistically significant and robust negative relationship between central bank financial strength and inflation. On this matter, Bindseil et al (2004) developed a simple comprehensive model of the relationship between a central bank's balance sheet structure and its inflation performance and concluded that capital seems to remain a key tool to ensure that independent central bankers always concentrate on price stability in their monetary policy decisions. As Brione (2004) commented, this paper contributed to the growing debate on the importance of a central bank's balance sheet.

Another pressing question concerns the optimal level of the capital of the central bank. Sinclair and Milton (2011) in the introduction to their book *The Capital Needs of the Central Bank*, discussed three different viewpoints on this issue: firstly that for a central bank owned by the state the issue is irrelevant; secondly, optimal central bank

capital should be derived from first principles, and thirdly, evidence may be considered as a tool to judge the appropriateness of financing arrangements for central banks. On this issue, the proposition presented throughout this book is that there is no single formula for a central bank's optimum capital that holds for all countries. Indeed, in the literature, there is no precise definition of what the optimal level of capital should be.

Stella (2005) identified four different ways that central banks have used in practice to determine their own level of capital: (1) An absolute nominal value of capital; (2) A target ratio of capital to another central bank balance sheet item; (3) A target ratio of capital to a macroeconomic variable; (4) According to the perceived risks to the 'solvency' of the bank. Prior to this, Stella (1997) argued that the appropriate level of central bank net worth is sufficient to ensure that in the normal course of operations, the bank will preserve its financial independence from the Treasury. Martinez-Resano (2004) also attempted to define the factors which determine the optimal level of capitalisation. He surveyed the full range of risks that a central bank's balance sheet is subject to and, using a simple Vector Autoregressive Model (VAR), analysed the interplay between capitalisation, accounting rules and dividend distribution in order to determine a simple benchmark for central bank financial strength. He concluded that, in the long-run, central banks' financial independence should be secure as along as demand for banknotes is maintained. However, in the short- and medium-term, he found that financial vulnerability could impact on a central bank's effective independence unless adequate capitalisation is secured. Ernhagen, Vesterlund and Viotti (2002) provided some calculations regarding the minimum level of capital for the Riksbank, although they admit that it is impossible to provide a precise answer.

Bini Smaghi and Gros (2000) constructed an index of central bank capitalisation as the ratio to total liabilities over the monetary base in percentage, whereby a value close to 100 indicated a balance sheet that is determined only by monetary policy operations. For 1999, the Bundesbank was identified as having the lowest capitalization levels with an index of 131 while the Banco de Portugal stood at the

other extreme with an index of 306.2. When compared with the US Federal Reserve and the Bank of Japan, the Eurosystem was significantly more capitalised, explained by the fact that at the inception of the Eurosystem, the EANCBs kept the assets and liabilities they had accumulated.

More recently, Buiter and Rahbari (2012b) analyzed whether each of the EANCB was over or under capitalized by observing the loss absorbing capacity of each of the central bank and examined the distribution of the Eurosystem's capital amongst the EANCBs. According to Buiter and Rahbari (2012b), since the Eurosystem capital is not distributed evenly across the EANCBs, their ability to respond to capital calls by the ECB is potentially limited. In this 2012 study by Buiter and Rahbari, the actual reserves (consisting of capital and reserves, revaluation accounts and provisions) are compared with those predicted by applying the ECB capital share of each EANCB to the consolidated Eurosystem financial buffer. Buiter and Rahbari (2012b) concluded that in 2010, AT, FR, IT, NE, PT and to a lesser degree DE were over capitalised while BE, CY, FI, GR, IE, LU, MT, SK, SI and ES were under capitalised. Based on this study, Chapter 4 replicates the same exercise but considers the 2006-2016 time span rather than one point in time, providing an analysis of how capitalization of the EANCBs varied across time.

The empirical calculations on this matter concern the construction of a benchmark indicator that sheds light on the degree of capitalization of one central bank relative to another rather than determining the optimal level of central bank capital. Indeed, to my knowledge, none of the existing literature presented a conclusive empirical investigation of the optimal level of central bank capital.

2.1.4 The Central Bank's Balance Sheet and the Response to the Recent Financial Crisis

In the wake of the recent financial crisis, central banks operated in uncharted waters, implementing policies that were not previously part of their toolkit but that highly

impinged on their balance sheet as these fall under the broader category of balance sheet policies, whereby the central bank uses its balance sheet to affect asset prices and financial conditions beyond the short-term interest rates. Indeed, as Caruana (2011) puts it 'one of the lessons of the recent crisis is that more attention must be paid to balance sheets than was the case before the crisis'.

The strand of literature studying the balance sheet policies and the resulting quantitative and qualitative changes to the balance sheet has grown rapidly over a short time span. The balance sheet of "main" central banks expanded through quantitative easing for commercial banks while their quality deteriorated as the requirements for collateral were reduced. Various studies such as Nagel (2012) and Sibert (2014) amongst others reviewed the monetary policy of the Federal Reserve, the ECB and the Bank of England after the crisis began in 2007. Other authors, namely Bagus and Howden (2009) and Bagus and Schiml (2009) identified the substantial deterioration of the balance sheets of "main" central banks and the growing exposure to risk. These studies reveal that during the crisis period changes in central banks' balance sheets impacted the quality of money.

Various other contributions to the empirical literature related to the unconventional monetary policies adopted since the outbreak of the financial crisis examined the effects and transmission channels of quantitative easing programmes particularly focusing on the impact of purchases on the available supply of specific assets to the private sector - the portfolio rebalancing channel (Joyce et al, 2011; ECB, 2017b). The literature has also examined the role of announcements regarding future bond purchases and their effect on market participant expectations - the signalling channel (Cecioni, Ferrero and Secchi, 2011). Other related literature investigates the effects of the unconventional monetary policy measures on macroeconomic variables (refer to Lenza, Pill and Reichlin, 2010; Giannone et al, 2011; Peersman, 2011b) and the impact on the slope and level of the yield curve (see for instance Joyce et al, 2010). Despite that these themes relate to the balance sheet policies, they are not directly related to

investigations presented in this thesis and therefore a detailed review of this literature falls beyond the scope of this Chapter.

2.1.5 The Role of Central Banks' Balance Sheets in Signalling Risk

The design of central bank balance sheets can also be viewed as a determinant of the type of risk exposure of central banks (Pattipeilohy, 2016). This became even more important as the non-standard monetary policy measures adopted as a response to the financial crisis have had a substantial impact on the risk exposures of central banks.

As Donnery et al, (2017) explained, the more relevant form of interest rate risk for the Eurosystem relates to a potential mismatch in the sensitivity of the Eurosystem's assets and liabilities to changes in short term interest rates. Under the Asset Purchase Programme (APP), the central bank acquired fixed income bonds at a time of relatively low interest rates. Meanwhile, most of the Eurosystem's liabilities are primarily deposit based with a variable rate. In other words, while a large amount of assets entail securities purchased at very low yields, a significant portion of central bank liabilities are linked to policy rates which are expected to rise in the future. These issues have been discussed in detail in the literature. Af Jochnick (2015) identified how some of these issues have affected the Sveriges Riksbank, also noting that central banks that have bought large volumes of bonds with long maturities will come under similar pressure. Floden (2016) also noted that the Riksbank will incur losses on bonds purchased as yields continued to move lower. Christensen, Lopez and Rudebusch (2013) identified similar issues in the context of the US Federal Reserve's holdings of securities under the quantitative easing programme. They identified a potential increase in interest income risk as short-term interest rates rise and consequently increases the funding cost of its securities portfolio. In this vein, Cukierman (2013) remarked that the risk taken by the Fed appeared to be higher than that of the ECB, even though ECB collateral has been broadened.

A number of EANCBs have also identified the growing risks on their balance sheets and have taken steps to mitigate these risks. Weidmann (2017) explicitly highlighted the growing maturity mismatch on the Bundesbank balance sheet. Other EANCBs highlighted their exposure to increasing risk in their Annual Reports. De Nederlandsche Bank, in its 2015 Annual Report, states that quantitative easing has resulted in greater balance sheet risks. In its 2016 Annual Report, the Central Bank of Ireland has also identified increased risks in the course of its regular risk assessment of its growing balance sheet. Consequently, most of these EANCBs introduced an additional risk provision in compliance with ECB accounting guidelines. Various authors such as Ingram (2011) and Stella and Lonnberg (2008) supported this use of risk provisions by central banks, the former noting that it enables the ECB to reduce the potential volatility in its distributable annual profits.

2.1.6 The Composition of Central Banks' Balance Sheets

The financial crisis brought with it a change in the perspective towards central bank balance sheets as well as in their relevance to macroeconomic developments. Prior to the crisis, many macroeconomic models, notably the standard New Keynesian framework as summarized by, for example, Eggertson and Woodford (2003), considered the composition of central bank balance sheet as irrelevant for monetary policy purposes. According to this strand of thought, the composition of the balance sheet is only relevant as signaling information on the central bank's reaction function. Subsequently, the recent unconventional monetary policy measures by central banks instigated an interest in the literature analyzing the conditions under which central bank balance sheet measures invoke portfolio rebalancing effects (Greenwood and Vayanos, 2008, Vayanos and Vila, 2009). In this regard, a number of studies assessed the relevance of portfolio rebalancing effects by examining the effects of balance sheet policies on term and risk premia (Gagnon et al, 2011; Joyce et al, 2011; Bauer and Rudebusch, 2014). Often, however, these studies, which comprise theoretical models analyzing unconventional monetary policy, did not take into account other dimensions apart from portfolio rebalancing. One exception to this was, however, a

comprehensive theoretical framework presented by Curdia and Woodford (2011) that studied the effects of innovations on central bank balance sheet composition along multiple dimensions. However, as noted by Pattipeilohy (2016), being a closed-economy model, the analysis by Curdia and Woodford was rather restrictive.

In the midst of the recent financial crisis, when interest in the central bank balance sheet was slowly gaining ground, Bagus and Howden (2009) emphasized the importance of the analysis of a central bank's balance sheet for the evaluation of the quality of the currency it backs. They argued that it is possible that the total of assets on the balance sheet do not change while the composition of the balance sheet may deteriorate substantially, causing inflationary pressures. This brought along a new strand of literature that does not focus merely on size metrics but on the composition of the balance sheet. In this regard, Lenza, Pill and Reichlin (2010) distinguished between quantitative and qualitative easing. Quantitative easing refers to an alternative approach to policy that give rise to an expansion of the central bank balance sheet, which does not alter the composition of the asset side of the balance sheet. In contrast, in case of qualitative easing, the overall size of the central bank balance sheet is unchanged, but the composition of asset holdings is changed and risk is enhanced. Lenza, Pill and Reichlin (2010) concluded that prior to the Lehman failure, only a change in the composition of the asset side of the "main" central banks' balance sheet was registered. Subsequently, elements of both quantitative and qualitative easing were employed registering both changes in the composition and an overall expansion of the balance sheet (Lenza, Pill and Reichlin, 2010). Similarly, Farmer (2013) argued that both qualitative and quantitative easing policies were used in the recent crisis and both were, in his view, successful.

Against this background, unsurprisingly, the branch of literature that studies the effects of changes in central bank balance sheet composition is still at its infancy. Following this new perspective, new literature perceiving the size and composition of a central bank balance sheet as an indicator of the aggressiveness of the policy efforts of the monetary authorities is emerging. To date, few empirical papers

explicitly used the size and composition of the balance sheet to characterise monetary policy strategies. These studies, mostly covering "main" central banks in advanced and emerging economies, are reviewed in Chapter 6. Since to my knowledge, none of these studies cover a system of central banks such as the Euro Area, Chapter 6 aims to address this gap in the literature.

2.1.7 The Central Banks' Balance Sheets: the Fed, the Eurosystem and the Bank of England

The balance sheet of a central bank provides detailed information about how it uses its monetary policy instruments and how monetary policy is implemented. Indeed, the composition and the size of the balance sheets of "main" central banks such as the Federal Reserve System (Fed), the Eurosystem and the Bank of England have been significantly affected by the variety of monetary policy measures implemented over the course of the financial crisis. Through a comparison of the balance sheets of these "main" central banks, various authors discussed the similarities of and the differences between the central banks' responses to the crisis and their implications on their balance sheet.

Looking at the balance sheets of the Fed, the Eurosystem and the Bank of England (BoE), Sibert (2014) observed that over the course of the liquidity crisis (August 2007 – June 2008) the size of the balance sheets were only slightly changed though their composition changed. In contrast, during the solvency crisis (July 2008 – April 2010), these balance sheets expanded both in terms of size and composition. Subsequently, over the sovereign debt crisis (May 2010 – Spring 2014), while the balance sheets of the Fed and the BoE expanded markedly, the expansion of the balance sheet of the Eurosystem was only temporary. A similar description of developments in the balance sheets of the Eurosystem and the Federal Reserve up to August 2009 was provided by the ECB in its Monthly Bulletin, October 2009.

Gros (2012) also highlighted the increase in the size of the central bank's balance sheets of the Eurosystem and the Fed and noted their similar magnitudes. However, he warns that a simple comparison between the size of the balance sheets or their increase is inappropriate - instead arguing that one qualitative difference between the Eurosystem and the Fed is more important than the balance sheet size. While loans to banks by the Fed were very low, the Eurosystem lent huge amounts to weak banks with no access to market funding. In this vein, Santor (2013) observed that while purchases of government debt constituted the bulk of most central banks' balance sheets, Long-Term Refinancing Operations represented most of the increases in the Eurosystem's balance sheet at least for the first half of the crisis period. While the Federal Reserve engaged in Quantitative Easing (QE), the ECB opted for credit easing and touched upon QE only towards the end of the crises in 2015. These had diverging implications on their respective balance sheets. For example, as discussed in Chapter 6, the ECB's 'enhanced credit support' programme which involved primarily bank-based non-standard measures, expanded the Eurosystem balance sheet through an increase in domestic private sector debt on its asset side. By contrast, the Bank of England and the Fed undertook large-scale asset purchases predominantly from non-bank counterparties, increasing their domestic public sector debt on their asset side of the balance sheet.

Various other authors have also analysed the developments of the balance sheet of the Eurosystem[3] and the Fed in light of the recent economic turmoil (Cecchetti, 2009; Bagus and Schiml, 2009; Hamilton, 2009). In this vein, Bagus and Howden (2009) also looked at balance sheet developments of the Eurosystem and the Fed. They noted that as the balance sheet expanded and its composition changed, the average quality of the assets deteriorated on average. Moreover, by focusing on non-numerical regulatory measures that affected the balance sheet such as changes in terms, collateral, counterparties and transparency, they concluded that the Eurosystem's

[3] These analysis concern only developments in the consolidated Eurosystem balance sheet as published by the ECB. Chapter 4 investigates developments in a new definition of the Eurosystem whereby intra-Eurosystem transactions are not consolidated.

balance sheet appeared to be in a poorer shape than the Fed's, on account of broadened collateral and a declining equity ratio.

Similarly, Rodriguez and Carrasco (2014) also examined developments in the Eurosystem's and the Fed's balance sheets noting that since the collapse of Lehman Brothers, while the Fed and the BoE expanded their balance sheet sharply, the expansion in the Eurosystem's balance sheet was only moderate at the beginning, increasing steadily over time. Interestingly, Lenza, Pill and Reichlin (2010) attributed this to the fact that the Eurosystem's balance sheet was already higher than the balance sheet of the Fed and the BoE in terms of its share to GDP. Lenza, Pill and Reichlin (2010) also argued that initially the ECB addressed the crisis through changes in the structure of the assets of the balance sheet rather than its expansion by engaging in operations with their regular counterparties. Cour-Thimann and Winkler (2012) provided another reason for the delay in the expansion of the Eurosystem's balance sheet, being the fact that before the mid-2010, the stronger effects of the crisis appeared to take place in the US and the UK. Despite these explanations, from the beginning of the crisis until the end of 2012, the Eurosystem's and the Fed's balance sheets almost tripled. Subsequently, by mid-2014, the Eurosystem's balance sheet has shrunk by half as money markets regained their role as the principal market for bank funds, consequently lowering the demand for central bank money.

Other articles/academic papers focused specifically on how monetary policy implementation and liquidity provision during the financial crisis have affected the size and composition of the Bank of England's balance sheet. In particular, Cross, Fisher and Weeken (2010) concluded that the large expansion of the BoE's balance sheet reflected an expansion of both the BoE's liquidity insurance operations as well as the addition of asset purchases.

2.2 The Balance Sheets of EANCBs: Related Literature

As noted earlier, most of the existing literature focuses on the balance sheets of "main" central banks such as the Eurosystem, the Federal Reserve, the Bank of England and the Bank of Japan, amongst others. Only a sparse literature focuses on specific components of the EANCBs' balance sheets namely, the importance of transfers between EANCBs and the treatment of banknotes in circulation and reserves. While this literature is reviewed below, it emerges that one gap in the literature relates to the relationship between the EANCBs, the ECB and the Eurosystem from a balance sheet perspective. This is the motivation of the studies presented in this thesis.

2.2.1 Target2

The most significant change in the balance sheets of EANCBs has been associated with Target2 (T2) transfers. Target2 (Trans-European Automated Real-time Gross Settlement Express Transfer system) is the real-time gross settlement system for euro-denominated payments which mainly settles operations of monetary policy and money market operations. Thus, any transaction conducted across borders in the EMU is processed via the Target2 system. These transfers and their implications for central bank balance sheets provoked a significant outpouring of opinion pieces and academic articles.

A number of contributions, such as by Sinn and Wollmershäuser (2011) and Cour-Thimann (2013), emphasized the relationship between Target2 balances and current account deficits. The former, in particular, argued that increased Target2 balances have effectively financed current account deficits in the periphery countries over the crucial years of the crisis. In the same vein, Sinn (2011a), labelled the increase in these balances as a 'secret bailout' of the Euro Area's periphery and has characterized the system as playing a key role in enabling these economies to run large current account deficits. However, such comments were later considered as misleading by other

authors such as Whelan (2017). Indeed, in contrast, Whelan (2017) argued that Target balances resulted from the interaction of a common monetary policy with the freedom of movement of capital. Whelan (2017) associated the increase in T2 balances prior to 2012, to the deposit flight from the Euro Area hard-hit countries and the ECB's agreed full-allotment policy.

Other authors[4] also contributed to the literature on Target2. For example, Timmer (2014) investigated the determinants of the changes in Target2 balances while Moro (2015) analyzed the accumulation of Target2 imbalances and the fragmentation of the European financial system along national borders. Moreover, Bindseil and König (2012) explained the relationship between T2 positions and the monetary base.

Another strand of literature on this matter compares Target2 mechanism with the Federal Reserve Interdistrict Settlement Account (ISA). According to the Federal Reserve Accounting Manual (pp 136 – 138), the ISA balances should be settled every year in April and netted via transfer of gold certificates between reserve banks. In contrast, there is no settlement mechanism in the Eurosystem. However, there is an ongoing debate in the literature on whether the rules of the accounting manual have been followed as the New York Fed accumulated a large positive ISA account while the Richmond and San Francesco Fed have accumulated a negative ISA account (Bijlsma and Lukkezen, 2012). In contrasting the Eurosystem with the Federal Reserve System, Sinn (2011a; 2011b) proposed the annual settlement of Target balances on the grounds that this is the approach adopted by the Federal Reserve Banks. However, Whelan (2011) presented contrasting views arguing that Federal Reserve Banks have no fiscal connection with the states that they serve. A number of reforms to the Target2 payments system were also put forward by authors such as Sinn (2011). In particular, he proposed the setting of a cap on Target2 accounts but was argued against by Whelan (2011) who interpreted this proposal as the end of the Euro as a single currency.

[4] Other contributions to the literature on Target2 include Jobst et al, (2012), Auer (2012), Cecioni and Ferrero (2012), Whelan (2017), and Buiter et al, (2011).

As reviewed above, the literature attempts to answer a series of questions related to Target2: What do the increasing claims of the EANCBs represent? Are they subsidized loans by a group of EANCBs to other Euro Area countries? Or are they simply a consequence of the complex mechanics related to the construction of the Eurosystem and how it implements monetary operations? The existing literature that attempts to answer questions related to Target2 is vast and the above is not meant to present an exhaustive review. Nevertheless, since Target2 is an important element in the analysis presented in Chapter 4, a concise review of the literature on this item is presented there.

2.2.2 Euro Banknotes

One particular component on the EANCBs' balance sheets that attracted some attention in the literature is the 'Banknotes in Circulation', being the most important liability item. Krsnakova and Oberleithner (2012) described the innovative manner in which banknotes in circulation are presented to allocate them adequately across the balance sheets of the Eurosystem central banks, requiring regular accounting adjustments of the circulating banknotes. In brief, the ECB should, as a rule, report eight per cent of total banknotes in circulation in its balance sheet. The remaining 92 per cent are to be presented in the balance sheets of the EANCBs in proportion to their paid-up shares in the ECB capital. The latter constitute the Banknote Allocation Key. The various EANCBs regularly report to the ECB how many banknotes they have put into and taken out of circulation. The difference between the net amounts of banknotes put into circulation by the individual EANCBs and the amounts of banknotes allocated to them (on the basis of the Banknote Allocation Key) give rise to intra-Eurosystem balances. In the same vein, Handig and Holzfeind (2007), based on the balance sheet of the Austrian central bank over the first five years since the cash changeover, concluded that all relevant aspects of the Eurosystem's banknote circulation and seigniorage income rules ensure a fair allocation of monetary income.

2.2.3 Reserves

Up until recently, most of the research on QE has generally paid little attention to the role of reserve dynamics within the banking system and some have assumed that the system passively absorbs additional reserves generated by asset purchases. However, in 2019, in a study of the Central Bank of Ireland, Whelan et al, focused on the expansion in reserve accounts on the liability side of the Eurosystem balance sheet, which mirrors the purchase of financial assets that drive the expansion of the asset side of the balance sheet. Whelan and Ellen (2019) describes the evolution of central bank reserves in the Euro Area in recent years, noting that the build-up in reserves since the financial crisis has not occurred uniformly across countries, varying both in terms of magnitude and dynamics. Moreover, in line with investigation in Chapter 6, Whelan and Ellen (2019) observe that there are large discrepancies across countries between APP purchases by the EANCBs and the build-up of reserves by banks in those countries. In this context, Baldo et al, (2017) highlighted that the likely receipts of liquidity inflows directly related to Eurosystem purchases are concentrated in specific countries such as France, Germany, Belgium and Luxembourg. Using bank-level data, Whelan and Ellen (2019) also found that banks appear to be primarily managing reserves through debt security purchases and seems likely to have had an effect on European bond yields that is distinct from the portfolio rebalancing effect.

2.3 Synthesis and Gaps

2.3.1 Synthesis of the Literature

Chapter 1 posited that the balance sheet of a central bank has a crucial role in the setting of monetary policy and that it offers an additional purpose in the case of a system of central banks. The balance sheets of central banks within a monetary union were identified as the tool to define the system as a whole and to divulge information on the relationships between the central banks operating within the system as well as with their 'parent' central bank. This Chapter has sought to review some of the

literature related to the former point while the literature related to the latter is found to be very scarce. The following salient points emerge:

i. Central bank balance sheets serve a very different purpose to commercial bank balance sheets. Whereas in the commercial sector balance sheets serve the purely commercial function of channeling funds from savers to borrowers, central bank balance sheets serve an important policy function through the provision of central bank money to the economy.

ii. A central bank's balance sheet is a source of information about the financial strength of the central bank - the financial buffers are one of the main components of the balance sheet. Although over the last few years, this subject attracted increasing attention, there is still no consensus on the optimal measure of the central bank's capital.

iii. Through balance sheet policies, in the wake of the recent financial crisis, the central banks used their balance sheets to affect asset prices and financial conditions – as their conventional monetary policy tool was no longer feasible. This led to the design of the central bank's balance sheet to be identified as a determinant of the type of risk exposure of central banks.

iv. Size metrics do not provide a complete picture of the effects of the financial crisis on the central bank's balance sheet. In addition to quantitative easing, qualitative easing was also employed during the crisis by "main" central banks, highlighting the importance that should be attached to the structure and composition of the central bank balance sheets.

2.3.2 Gaps Addressed by this Thesis

This review has shed light on some core findings from research to date on the topic of central bank balance sheets, focusing particularly on their role. Even though there

have been analyses of central bank balance sheets as early as Hayek, 1925 (cited in Bagus and Schiml, 2009), overall, the analysis of central bank balance sheets has been neglected and has never stood in the centre of the analysis of monetary policies. Since the turmoil of the financial crisis, though slowly, this is changing. The analysis of central bank's balance sheet is becoming a new field of the analysis of monetary policy. Despite this, however, the role of the balance sheet of national central banks operating within a system of central banks remain highly neglected and a number of questions remain to be answered:

1. Firstly, the size of the Eurosystem's 'parent' central bank is assumed to be equivalent to the balance sheet of the Eurosystem. However, a new measure of the Eurosystem can be the tool that facilitates further investigation on the relationship between the EANCBs, the ECB and the Eurosystem. In this context, the position of the EANCBs vis-à-vis the ECB has been overlooked and it seems particularly opportune to examine whether they operate on autopilot as branches of the ECB. It is interesting also to examine how the relationship between EANCBs and the ECB compares with the relationship between the District Banks and the Federal Reserve.

2. Secondly, the debate on determining an optimal level of capital, as outlined in the earlier literature review, has not reached a consensus yet. In the context of the Eurosystem, a more fundamental – as yet unanswered – question concerns the distribution of the capital amongst the EANCBs and how this changed during the financial crisis period, if at all.

3. Thirdly, despite the recent prominence given to the composition of the balance sheets, the composition of the EANCBs' balance sheets remains to be investigated. This will shed light on the interlinkages between each EANCB and the structure of the Eurosystem as a whole.

The following Chapter presents a new dataset comprising of all the balance sheets of the nineteen EANCBs over the 2006-2016 period, which serve the basis of the

manuscripts presented in Chapters 4, 5 and 6 positioned to address these gaps in the literature. The first study examines the dataset and identifies the relationship between the EANCBs, the ECB and the Eurosystem by taking various balance sheet aspects. The second study presents an econometric investigation of the link between the EANCBs and the ECB. The third study examines the evolution of the composition of the EANCBs, in turn revealing interlinkages between them.

Chapter 3

The Balance Sheets of Euro Area National Central Banks: A New Dataset

The main purpose of this thesis is to conduct balance sheet analysis applied to the Euro Area National Central Banks in order to reveal the relationships between these EANCBs, the ECB, and the Eurosystem. This Chapter presents a new dataset necessary to conduct this analysis.

This Chapter compiles a new historical dataset of the balance sheets of all the nineteen individual EANCBs and the ECB spanning over the 2006 to 2016 period. This dataset provides the basis for the computation of a new balance sheet of the Eurosystem - a detailed set of disaggregated accounts of the Eurosystem - presented in Chapter 4 and analysed in the three main studies in this thesis. Moreover, the wealth of detailed information contained in this dataset may also be of use to other researchers.

The later part of this Chapter also documents necessary adjustments to the data including adjustments related to the Capital Key as well as to particular balance sheet items, such as the intra-Eurosystem transactions.

3.1 The Balance Sheets of the National Central Banks

3.1.1 Data Source and Frequency

The new dataset comprises of a comprehensive record of the balance sheets of the individual EANCBs and the ECB. The dataset is very detailed such that each balance sheet consists of eleven main items on the assets side and fifteen main items on the liabilities side complemented by nineteen sub-items.

The only published information about the composition by country of the Eurosystem assets and liabilities is the scattered dispersed information published by the individual EANCBs in their annual financial accounts. This implies that the information for this dataset could only be accessed by delving into individual EANCBs' end-of-year financial accounts published in their Annual Reports. Indeed, prior to 2016, the ECB used to publish only the consolidated Eurosystem balance sheet and not a disaggregation for each EANCB.

In a bid to strengthen the Eurosystem's accountability and transparency, as from July 2016, the Governing Council of the ECB decided to publish monthly breakdowns showing how the ECB and the EANCB balance sheets contribute to the Eurosystem statistical balance sheet. However, this differs from a simple amalgamation of all the nineteen individual EANCBs and the ECB since it includes a consolidation adjustment. This will be the subject matter discussed in Chapter 4, which produces an alternative set of Eurosystem financial statements at the end of each year between 2006 and 2016 computed as the amalgamation of the EANCBs and the ECB and therefore distinct from those published by the ECB.

Despite that the collection of data from individual EANCBs' annual reports remains a tedious exercise, this was not barred by measurement problems and lack of transparency. On the other hand, collection of data was facilitated by consistency in accounting standards as the ECB and EANCBs follow common Eurosystem

accounting rules as set out in the relevant ECB guidelines[5]. Moreover, the harmonization of accounting rules allow the individual data of the EANCBs and the ECB to be aggregated in a meaningful way and ensure valid cross-section analysis.

The complete dataset (Tables I – XX) is presented in Appendix 3.1 and includes detailed data on the components of the assets and liabilities sides of the balance sheet of each EANCB and the ECB for the 2006-2016 period.

Frequency of the Data

This new dataset is presented on an annual (end-of-year) basis since data at a higher frequency (quarterly or monthly) do not cover the entire panel of EANCBs under study. Monthly data covering the entire 2006-2016 period are available for some central banks such as for BE, CY, DE, EL, FL, IE, IT, NE, LT, LV, MT and SI. For other EANCBs, however, data is only published on a quarterly or annual basis. As the ECB started publishing a disaggregated financial statement of the Eurosystem on a monthly basis as from July 2016, data are available on a monthly frequency for the entire panel of the EANCBs only for the period July 2016 – December 2016 (December 2016 being the end point of the period under analysis).

Monthly or quarterly data provide further information and are preferred than annual frequency. Although, very often one is able to reach the same general conclusions when yearly data is used, movements in the balance sheet size that are captured by looking at the monthly data are unnoticed when using yearly data (refer to Figure 3.1 and Figure 3.2).

[5] Guideline (EU) 2016/2249 of the ECB of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34).

Figure 3.1 Bundesbank Total Assets - Monthly Data

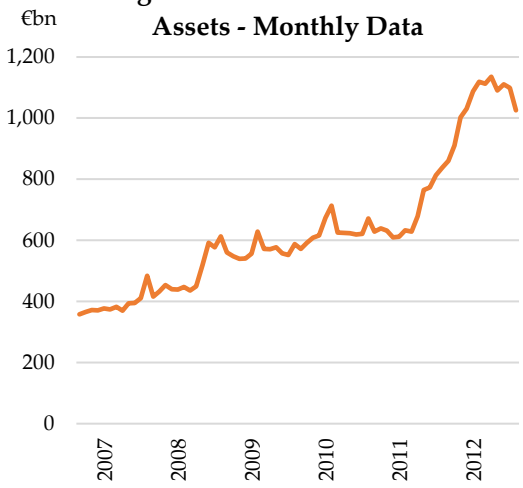
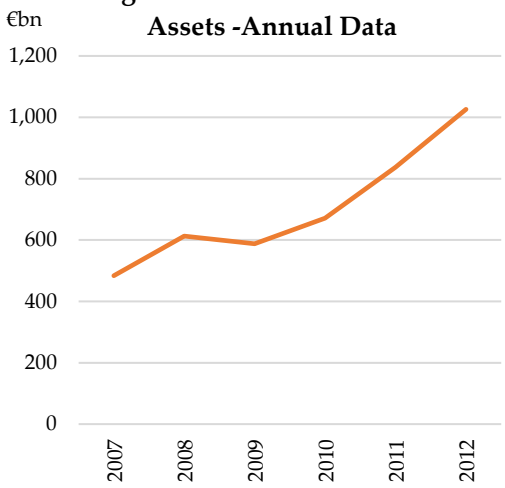


Figure 3.2 Bundesbank Total Assets -Annual Data



3.1.2 Adjustments to the Data

Whilst conducting the analysis presented in the following Chapters, some adjustments to the data were necessary for a more accurate study. For ease of reference, these adjustments are documented below. The first adjustment relates to the apportionment of the ECB amongst the EANCBs while the second adjustment relates to the Capital Key. In contrast with the ECB position, this latter adjustment accentuates the importance of the fully paid-up capital rather than the subscribed capital (in line with both business practice and the literature). The third adjustment relates to banknotes in circulation and is necessary due to the accounting treatment of this item in the balance sheets of the EANCBs.

3.1.2.1 Apportioning the ECB amongst the EANCBs

Table 3.1 presents the total assets/liabilities for the nineteen EANCBs and the ECB as published in their Annual Reports. However, since very often the analysis presented in this thesis focuses only on the EANCBs and exclude the ECB (such as when investigating relationships with the Capital Key in Chapters 4 and 5), it becomes necessary to apportion the ECB across the nineteen EANCBs. This implies that the level of total assets/liabilities for each EANCB is adjusted to include the apportionment of the ECB's assets/liabilities. In other words, the nineteen EANCBs

assume a portion of the ECB's assets (as ECB part-owners). This apportionment is carried out in line with the share of each EANCB in the ECB capital. As in Table 3.2, the adjusted total assets/liabilities for each EANCB is therefore larger than the level published in their respective Annual Reports.

3.1.2.2 The Capital Key

The analysis in Chapter 4 primarily questions whether, during the recent financial crisis, EANCBs acted on auto-pilot, expanding their balance sheets in line with their share of the capital of the ECB. Since such an investigation makes use of the capital shares of the EANCBs, this sub-section documents a detailed description of the necessary adjustments to the official Capital Key published by the ECB.

The European Monetary Union is constructed such that the National Central Banks are the owners of the ECB – the ECB's own capital is subscribed[6] by the National Central Banks. The National Central Banks that form part of the Eurosystem pay up their capital share in full. In contrast, non-Euro Area NCBs are required to contribute only to the operational costs incurred by the ECB in relation to their participation in the European System of Central Banks (ESCB) and therefore pay up a small percentage of their share in the ECB's subscribed capital[7].

Each EANCB owns a notional share of this ECB's subscribed capital, which is given formulaically by its "capital key": an equal weighting of the respective country's share in the total population and GDP of the EU. But as a measure of the true shares in the equity of ECB, the officially published "capital key" is a fiction, given the gap between subscribed and paid-up capital (refer to Appendix 3.2 and 3.3). (The official capital key represents the notional share of each EANCB in a counterfactual world

[6] The ECB's subscribed capital is automatically increased when a new Member State joins the EU and its National Central Bank joins the ESCB.

[7] When a non-Euro Area NCB joins the Eurosystem, the respective National Central Bank pays up the remainder of its contribution to the capital of the ECB.

Table 3.1 Total Assets/Liabilities of the EANCBs and the ECB

€bn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	53.4	61.9	83.8	71.6	79.8	99.3	109.4	97.5	92.8	107.0	122.6
Belgium	82.8	112.4	153.2	101.5	74.7	127.7	109.8	77.8	75.5	89.0	131.2
Cyprus			10.7	13.5	11.9	15.2	15.1	14.3	11.7	12.0	13.8
Estonia						3.1	4.3	4.3	6.0	6.7	6.8
Finland	19.8	22.8	30.0	35.6	46.0	98.1	101.2	49.7	47.7	57.4	79.5
France	232.2	360.7	553.0	506.1	481.6	709.3	731.8	550.0	577.7	710.4	845.4
Germany	373.5	483.7	612.6	588.0	671.3	837.6	1,025.3	801.0	770.8	1,012.0	1,393.0
Greece	34.9	42.7	70.9	86.6	138.6	168.4	159.8	109.5	103.2	163.5	142.4
Ireland	40.3	53.5	116.1	124.9	204.5	176.2	137.5	108.1	81.3	77.2	82.8
Italy	218.6	244.4	267.4	301.3	333.0	539.0	610.0	554.4	530.6	587.4	773.7
Latvia									8.0	11.1	14.8
Lithuania										11.3	14.5
Luxembourg	52.4	59.0	100.6	77.0	79.7	127.2	120.4	118.6	117.1	159.0	200.9
Malta			2.7	3.2	3.6	3.6	3.6	3.6	4.3	4.5	5.5
Netherlands	67.2	102.1	114.6	131.2	133.4	266.6	254.4	158.5	140.2	210.4	290.3
Portugal	32.7	38.7	50.7	62.5	99.7	109.8	119.4	111.6	105.6	116.9	137.7
Slovakia				25.4	25.5	27.2	24.7	22.1	23.1	23.1	27.9
Slovenia		8.4	9.3	10.0	8.6	10.2	12.6	10.8	10.9	10.3	12.7
Spain	137.8	175.2	209.0	218.0	202.6	355.6	549.7	381.0	359.3	444.9	577.0
ECB	105.8	126.0	383.9	138.0	163.5	230.9	207.3	174.2	185.3	256.6	349.0

Source: Annual Reports of the National Central Banks and the ECB

Table 3.2 Adjusted Total Assets/Liabilities of the EANCBs
ECB apportioned amongst EANCBs as per Capital Key

€bn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	56.5	65.6	94.9	75.5	84.3	105.8	115.1	102.3	98.0	114.1	132.3
Belgium	86.5	116.8	166.8	106.3	80.4	135.7	116.9	83.9	82.1	98.0	143.5
Cyprus			11.4	13.7	12.2	15.6	15.5	14.6	12.1	12.6	14.6
Estonia						3.7	4.8	4.7	6.5	7.4	7.7
Finland	21.7	25.1	36.9	38.1	48.9	102.3	104.9	52.8	51.0	62.0	85.7
France	254.2	386.8	632.3	534.2	514.9	756.2	773.9	585.4	615.3	762.1	915.7
Germany	404.8	520.9	725.6	625.5	715.6	900.1	1,081.4	848.0	818.5	1,077.6	1,482.2
Greece	37.7	46.0	80.9	90.5	143.2	174.9	165.6	114.4	108.5	170.9	152.5
Ireland	41.6	55.1	121.0	127.1	207.1	179.9	140.8	110.9	84.4	81.5	88.5
Italy	237.9	267.1	336.4	326.0	362.2	580.2	647.0	585.6	563.2	632.3	834.7
Latvia									8.8	12.1	16.2
Lithuania										12.8	16.5
Luxembourg	52.7	59.3	101.5	77.4	80.1	127.8	120.9	119.0	117.6	159.7	201.9
Malta			3.1	3.4	3.8	3.8	3.8	3.8	4.5	4.7	5.9
Netherlands	73.1	109.2	136.1	139.1	142.8	279.7	266.2	168.5	150.8	225.0	310.2
Portugal	35.4	41.8	60.1	66.0	103.9	115.5	124.6	116.0	110.2	123.3	146.4
Slovakia				26.8	27.1	29.5	26.8	23.8	25.1	25.9	31.7
Slovenia		8.9	11.1	10.6	9.3	11.3	13.6	11.6	11.8	11.5	14.4
Spain	149.3	188.9	250.6	234.4	222.1	383.0	574.3	401.6	382.7	477.1	620.8

Source: Annual Reports of the National Central Banks

where all EU countries had adopted the Euro.) In the analysis that makes use of the Capital Key, therefore, the shares of fully paid-up capital are, instead, considered as the true capital shares of each EANCB in the ECB. A further minor adjustment is then carried out so that when the non-Euro Area NCBs are excluded, the capital shares of the Eurosystem members (based on the paid-up capital) are rebased to sum to 100 per cent. The resultant shares are referred to as the 'Adjusted Capital Key (ACK)', presented in Table 3.5.

The ECB publishes the share of each EANCB in the ECB's subscribed capital – the official capital key (Table 3.3) and the subscribed and fully paid-up capital of each EANCB in absolute terms (Appendix 3.2 and 3.3). Based on this, this study computes the true capital share of each EANCB which reflects the distribution of the fully paid-up capital (Table 3.4) rather than the fictional subscribed capital. Moreover, given that the studies carried out in this thesis focus on the Euro Area NCBs, the capital shares are rebased to eliminate the non-Euro Area NCBs (Table 3.5) as explained earlier. As an example of the above adjustments, in 2016, while the Deutsche Bundesbank's official "capital key" was 18.0 per cent, its share of paid-up capital was 25.2 per cent. When the non-Euro Area countries are excluded, this share is then minimally adjusted upwards to 25.6 per cent.

This approach towards the Capital Key is not new in the literature; in particular, studies[8] by the central bank of Austria that make use of the Capital Key take a similar approach and calculates the Adjusted Capital Key for specific years. Since the studies in this thesis cover the 2006-2016 period, however, the Adjusted Capital Key is computed for the entire period in question.

[8] Such studies include Handig and Holzfeind (2007); Jobst, Handig and Schneeberger (2012) and Krsnakova and Oberleithner (2012);

Table 3.3 Subscribed Capital Shares of the ECB – The Capital Key
Euro Area and Non-Euro Area NCBs

	2006	2007	2008	2009-2010	2011-2012	2013	2014	2015-2016
Euro Area NCBs								
AT	2.0800	2.0159	2.0159	1.9417	1.9417	1.9370	1.9631	1.9631
BE	2.5502	2.4708	2.4708	2.4256	2.4256	2.4176	2.4778	2.4778
CY			0.1249	0.1369	0.1369	0.1333	0.1513	0.1513
EE					0.1790	0.1780	0.1928	0.1928
FI	1.2887	1.2448	1.2448	1.2539	1.2539	1.2456	1.2564	1.2564
FR	14.8712	14.3875	14.3875	14.2212	14.2212	14.1342	14.1792	14.1792
DE	21.1364	20.5211	20.5211	18.9373	18.9373	18.7603	17.9973	17.9973
GR	1.8974	1.8168	1.8168	1.9649	1.9649	1.9483	2.0332	2.0332
IE	0.9219	0.8885	0.8885	1.1107	1.1107	1.1111	1.1607	1.1607
IT	13.0516	12.5297	12.5297	12.4966	12.4966	12.4570	12.3108	12.3108
LV							0.2821	0.2821
LT								0.4132
LU	0.1568	0.1575	0.1575	0.1747	0.1747	0.1739	0.2030	0.2030
MT			0.0622	0.0632	0.0632	0.0635	0.0648	0.0648
NL	3.9955	3.8937	3.8937	3.9882	3.9882	3.9663	4.0035	4.0035
PT	1.7653	1.7137	1.7137	1.7504	1.7504	1.7636	1.7434	1.7434
SK				0.6934	0.6934	0.6881	0.7725	0.7725
SI		0.3194	0.3194	0.3288	0.3288	0.3270	0.3455	0.3455
ES	7.7758	7.5498	7.5498	8.3040	8.3040	8.2533	8.8409	8.8409
	71.4908	**69.5092**	**69.6963**	**69.7915**	**69.9705**	**69.5581**	**69.9783**	**70.3915**
Non-Euro Area NCBs								
BG		0.8833	0.8833	0.8686	0.8686	0.8644	0.8590	0.8590
HR						0.5945	0.6023	0.6023
CY	0.1300	0.1249						
CZ	1.4584	1.3880	1.3880	1.4472	1.4472	1.4539	1.6075	1.6075
DK	1.5663	1.5138	1.5138	1.4835	1.4835	1.4754	1.4873	1.4873
EE	0.1784	0.1703	0.1703	0.1790				
HU	1.3884	1.3141	1.3141	1.3856	1.3856	1.3740	1.3798	1.3798
LV	0.2978	0.2813	0.2813	0.2837	0.2837	0.2742		
LT	0.4425	0.4178	0.4178	0.4256	0.4256	0.4093	0.4132	
MT	0.0647	0.0622						
PL	5.1380	4.8748	4.8748	4.8954	4.8954	4.8581	5.1230	5.1230
RO		2.5188	2.5188	2.4645	2.4645	2.4449	2.6024	2.6024
SK	0.7147	0.6765	0.6765					
SI	0.3345							
SE	2.4133	2.3313	2.3313	2.2582	2.2582	2.2612	2.2729	2.2729
UK	14.3822	13.9337	13.9337	14.5172	14.5172	14.4320	13.6743	13.6743
	28.5092	**30.4908**	**30.3037**	**30.2085**	**30.0295**	**30.4419**	**30.0217**	**29.6085**
	100	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: ECB

Table 3.4 Fully Paid-Up Capital Shares of the ECB

Euro Area and Non-Euro Area NCBs

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Euro Area NCBs											
AT	2.830	2.814	2.807	2.700	2.718	2.723	2.731	2.740	2.761	2.746	2.746
BE	3.470	3.449	3.440	3.373	3.396	3.402	3.412	3.420	3.485	3.465	3.465
CY			0.174	0.190	0.192	0.192	0.193	0.189	0.213	0.212	0.212
EE						0.251	0.252	0.252	0.271	0.270	0.270
FI	1.754	1.738	1.733	1.744	1.755	1.759	1.764	1.762	1.767	1.757	1.757
FR	20.237	20.082	20.033	19.778	19.909	19.945	20.003	19.992	19.942	19.831	19.831
DE	28.762	28.643	28.574	26.336	26.511	26.559	26.636	26.535	25.311	25.170	25.170
GR	2.582	2.536	2.530	2.733	2.751	2.756	2.764	2.756	2.860	2.844	2.844
IE	1.255	1.240	1.237	1.545	1.555	1.558	1.562	1.572	1.632	1.623	1.623
IT	17.760	17.489	17.447	17.379	17.494	17.526	17.577	17.620	17.314	17.218	17.218
LV									0.400	0.395	0.395
LT										0.578	0.578
LU	0.213	0.220	0.219	0.243	0.245	0.245	0.246	0.246	0.286	0.284	0.284
MT			0.087	0.088	0.089	0.089	0.089	0.090	0.091	0.091	0.091
NL	5.437	5.435	5.422	5.546	5.583	5.593	5.610	5.610	5.631	5.599	5.599
PT	2.402	2.392	2.386	2.434	2.450	2.455	2.462	2.495	2.452	2.438	2.438
SK				0.964	0.971	0.973	0.975	0.973	1.086	1.080	1.080
SI		0.446	0.445	0.457	0.460	0.461	0.463	0.463	0.486	0.483	0.483
ES	10.581	10.538	10.513	11.548	11.625	11.646	11.680	11.674	12.434	12.365	12.365
	97.284	**97.021**	**97.046**	**97.059**	**97.702**	**98.131**	**98.416**	**98.385**	**98.417**	**98.447**	**98.447**
Non-Euro Area NCBs											
BG		0.086	0.086	0.085	0.066	0.054	0.046	0.046	0.045	0.045	0.045
HR								0.032	0.032	0.032	0.032
CY	0.012	0.012									
CZ	0.139	0.136	0.135	0.141	0.110	0.090	0.076	0.077	0.085	0.084	0.084
DK	0.149	0.148	0.148	0.144	0.113	0.092	0.078	0.078	0.078	0.078	0.078
EE	0.017	0.017	0.017	0.017	0.014						
HU	0.132	0.128	0.128	0.135	0.105	0.086	0.073	0.073	0.073	0.072	0.072
LV	0.028	0.028	0.027	0.028	0.022	0.018	0.015	0.015			
LT	0.042	0.041	0.041	0.041	0.032	0.027	0.022	0.022	0.022		
MT	0.006	0.006									
PL	0.489	0.476	0.475	0.477	0.372	0.305	0.258	0.258	0.270	0.269	0.269
RO		0.246	0.246	0.240	0.187	0.153	0.130	0.130	0.137	0.137	0.137
SK	0.068	0.067	0.066								
SI	0.032										
SE	0.230	0.228	0.227	0.220	0.172	0.141	0.119	0.120	0.120	0.119	0.119
UK	1.370	1.361	1.358	1.413	1.104	0.903	0.766	0.766	0.721	0.717	0.717
	2.716	**2.979**	**2.954**	**2.941**	**2.298**	**1.869**	**1.584**	**1.615**	**1.583**	**1.553**	**1.553**
	100	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Annual Reports of National Central Banks and own computation

Table 3.5 Adjusted Capital Key (ACK)^

Euro Area NCBs

	2006	2007	2008	2009-2010	2011-2012	2013 (Jul)	2014	2015-2016
AT	2.9095	2.9002	2.8924	2.7821	2.7750	2.7847	2.8053	2.7888
BE	3.5672	3.5546	3.5451	3.4755	3.4666	3.4757	3.5408	3.5200
CY			0.1792	0.1962	0.1957	0.1916	0.2162	0.2149
EE					0.2558	0.2559	0.2755	0.2739
FI	1.8026	1.7908	1.7860	1.7966	1.7920	1.7907	1.7954	1.7849
FR	20.8016	20.6987	20.6431	20.3767	20.3246	20.3200	20.2623	20.1433
DE	29.5652	29.5229	29.4436	27.1341	27.0647	26.9707	25.7184	25.5674
GR	2.6540	2.6138	2.6067	2.8154	2.8082	2.8010	2.9055	2.8884
IE	1.2895	1.2782	1.2748	1.5915	1.5874	1.5974	1.6587	1.6489
IT	18.2563	18.0260	17.9776	17.9056	17.8598	17.9088	17.5923	17.4890
LV							0.4031	0.4008
LT								0.5870
LU	0.2193	0.2266	0.2260	0.2503	0.2497	0.2500	0.2901	0.2884
MT			0.0892	0.0906	0.0903	0.0913	0.0926	0.0921
NL	5.5888	5.6017	5.5867	5.7144	5.6998	5.7021	5.7211	5.6875
PT	2.4693	2.4654	2.4588	2.5080	2.5016	2.5354	2.4913	2.4767
SK				0.9935	0.9910	0.9892	1.1039	1.0974
SI		0.4595	0.4583	0.4711	0.4699	0.4701	0.4937	0.4908
ES	10.8766	10.8616	10.8324	11.8983	11.8679	11.8653	12.6338	12.5596

^The ACK is computed such that the fully paid-up capital shares of the EANCBs sum to 100 per cent.
Source: Annual Reports of National Central Banks and own computation

Another detail concerning the data for the subscribed and fully paid-up capital shares worth mentioning is the fact that the shares of the individual NCBs in the key for subscription to the ECB's capital are recalculated by the ECB every five years and whenever there is a change in the composition of the EU or the Euro Area. Since the start of Stage Three of Economic and Monetary Union on 1 January 1999, the capital key has changed seven times. A five-yearly update was made on 1 January 2004, on 1 January 2009, on 1 January 2014 and on 1 January 2019. Additional changes were made on 1 May 2004 (when the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia joined the EU), on 1 January 2007 (when Bulgaria and Romania joined the EU) and on 1 July 2013 (when Croatia joined the EU). The entry of NCBs into the Euro Area also affects the Capital Key. Indeed, when Slovenia (2007), Cyprus (2008), Malta (2008), Slovakia (2009), Estonia (2011), Latvia (2014) and Lithuania (2015) joined the Euro area, the total capital key weight of the Euro Area NCBs in the ECB's overall capital increased, whereas the total capital key weight of the non-Euro Area NCBs decreased.

In 2010, the decision by the ECB[9] to increase its subscribed capital led to changes in the fully paid-up capital shares in 2010 as well as in 2011 and 2012, when the Euro Area NCBs paid the second and third instalment respectively. This change did not alter the official subscribed Capital Key. This explains the reason why in the above tables the subscribed capital shares do not change necessarily in tandem with the shares of the fully paid-up capital.

3.1.2.3 Intra-Eurosystem Transactions

One of the main items on the EANCB's balance sheet is the Intra-Eurosystem claims/liabilities. This item has attracted particular attention in the literature over the recent years as it sheds light on what was actually happening within the Euro Area from an economic and financial perspective. Given its economic relevance, this item also features prominently in the studies in this thesis.

For the 2006-2016 period, data on intra-Eurosystem claims/liabilities and their sub-components (apart from Target2) were collected from the balance sheets of the EANCBs published annually in their financial statements. In most of the EANCBs balance sheets, data on Target2 (T2) balances are recorded under 'Other claims/liabilities on the Eurosystem' and do not feature as a separate item. Therefore, data on T2 balances were collected from the dataset published by the ECB since 2008 and by the 'Euro Crisis Monitor' of the Institute for Empirical Economic Research at the University of Osnabrueck (see Steiankamp and Westermann, 2012) for the remaining years.

The components of the intra-Eurosystem claims/liabilities relate to the participating interest of the EANCBs in the ECB, claims arising from the transfer of foreign reserves

[9] Decision (EU) 2011/20 of the ECB of 13 December 2010 on the increase of the European Central Bank's capital (ECB/2010/26) OJ, 11/53.

Table 3.6 EANCB's Participating Interest in the ECB[10]

€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	116	117	117	112	144	177	209	212	222	222	222
Belgium	143	144	144	140	180	221	261	264	287	287	287
Cyprus			23	27	29	31	34	32	39	39	39
Estonia						80	83	83	89	89	89
Finland	74	73	73	78	99	120	141	141	144	144	144
France	835	836	836	825	1,062	1,299	1,536	1,535	1,545	1,545	1,545
Germany	1,183	1,196	1,196	1,091	1,407	1,722	2,038	2,031	1,948	1,948	1,948
Greece	393	390	390	435	468	501	534	531	565	565	565
Ireland	57	57	57	121	139	158	176	179	199	199	199
Italy	726	722	722	736	945	1,153	1,361	1,377	1,333	1,333	1,333
Latvia									115	115	115
Lithuania										207	207
Luxembourg	10	11	11	16	19	22	25	25	36	36	36
Malta			11	12	13	14	15	15	16	16	16
Netherlands	230	235	235	269	336	402	469	469	482	482	482
Portugal	100	101	101	114	144	173	202	213	204	204	204
Slovakia				194	206	217	229	229	263	263	263
Slovenia		55	55	58	64	69	75	75	82	82	82
Spain	433	438	438	663	802	940	1,079	1,078	1,313	1,313	1,313
Total EANCBs	**4,300**	**4,374**	**4,409**	**4,892**	**6,056**	**7,298**	**8,465**	**8,490**	**8,881**	**9,088**	**9,088**

Source: Annual Reports of the National Central Banks

[10] This item reflects the EANCBs respective contribution towards the greater part of the paid-up capital of the ECB. This item is not related to any form of interest paid to the EANCBs by the ECB.

Table 3.7 Claims Arising from the Transfer of Foreign Reserves to the ECB

€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	1,157	1,161	1,161	1,119	1,119	1,119	1,119	1,123	1,138	1,138	1,138
Belgium	1,419	1,423	1,423	1,397	1,397	1,397	1,397	1,401	1,436	1,436	1,436
Cyprus			72	79	79	79	79	77	88	88	88
Estonia						103	103	103	112	112	112
Finland	717	717	717	722	722	722	722	722	728	728	728
France	8,476	8,569	8,577	8,283	8,263	8,281	8,255	8,230	8,229	8,221	8,218
Germany	11,762	11,821	11,821	10,909	10,909	10,909	10,909	10,872	10,430	10,430	10,430
Greece	1,056	1,047	1,047	1,132	1,132	1,132	1,132	1,129	1,178	1,178	1,178
Ireland	513	512	512	640	640	640	640	644	673	673	673
Italy	7,263	7,218	7,218	7,199	7,199	7,199	7,199	7,219	7,134	7,134	7,134
Latvia									163	163	163
Lithuania										239	239
Luxembourg	87	91	91	101	101	101	101	101	118	118	118
Malta			36	36	36	36	36	37	38	38	38
Netherlands	2,223	2,243	2,243	2,297	2,297	2,297	2,297	2,299	2,320	2,320	2,320
Portugal	982	987	987	1,008	1,008	1,008	1,008	1,022	1,010	1,010	1,010
Slovakia				399	399	399	399	399	448	448	448
Slovenia		184	184	189	189	189	189	190	200	200	200
Spain	4,327	4,349	4,349	4,784	4,784	4,784	4,784	4,783	5,123	5,123	5,123
Total EANCBs	**39,983**	**40,322**	**40,438**	**40,294**	**40,274**	**40,395**	**40,369**	**40,350**	**40,565**	**40,797**	**40,797**

Source: Annual Reports of the National Central Banks and the ECB

Table 3.8 Net Claims/Liabilities Arising from Balances of Target2 Accounts

€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	-21,160	-20,301	-37,168	-19,630	-27,467	-34,591	-38,212	-40,249	-30,811	-29,147	-31,182
Belgium	-41,921	-61,663	-104,233	-42,520	-13,859	-52,845	-38,161	-15,495	-12,373	-7,748	-18,583
Cyprus			-6,542	-7,122	-6,441	-7,908	-7,468	-7,343	-2,678	2,380	5,865
Estonia						648	1,741	1,836	3,191	2,761	924
Finland	1,157	4,403	4,114	4,426	19,686	66,008	60,725	26,362	14,915	20,144	22,031
France		-11,935	-117,684	-62,008	-28,349	-79,629	-73,899	-34,100	-30,900	-29,242	-13,803
Germany	5,399	71,046	115,295	177,723	325,556	463,134	655,670	510,201	460,846	584,210	754,263
Greece	-8,184	-10,797	-35,348	-49,036	-87,088	-104,750	-98,355	-51,116	-49,319	-94,387	-72,257
Ireland	-2,545	-595	-44,364	-53,519	-145,185	-120,434	-79,259	-55,117	-22,745	-3,037	-952
Italy	22,856	35,804	23,452	55,276	3,699	-191,379	-255,102	-229,128	-208,945	-248,859	-356,559
Latvia									-797	-1,312	-5,292
Lithuania										240	-3,590
Luxembourg	5,327	18,428	42,225	52,618	68,043	109,547	106,286	103,793	105,238	147,571	187,381
Malta			-667	-814	-1,225	-422	-201	-672	-1,927	-922	1,019
Netherlands	9,931	-21,949	-18,786	15,429	40,500	152,783	120,772	46,115	19,412	54,727	87,000
Portugal	-6,601	-6,206	-18,952	-23,436	-59,912	-60,923	-66,025	-59,565	-54,591	-61,687	-71,588
Slovakia				-14,521	-13,311	-13,622	877	2,687	2,241	461	-5,119
Slovenia		-3,490	-3,556	-3,334	-2,092	-2,728	-4,409	-1,024	2,386	240	-1,248
Spain	25,075	-3,238	-34,921	-41,034	-50,864	-174,826	-336,831	-213,382	-189,718	-254,115	-328,075
ECB	3,546	17,241	234,096	3,971	-22,370	42,159	-2,197	-6,721	-23,639	-83,756	-159,741
Total Claims (T2)	**73,290**	**146,922**	**419,182**	**309,443**	**457,484**	**834,279**	**946,071**	**690,994**	**608,228**	**812,735**	**1,058,483**
Total Liabilities (T2)	**-80,411**	**-140,174**	**-422,222**	**-316,974**	**-458,165**	**-844,057**	**-1,000,121**	**-713,913**	**-628,443**	**-814,220**	**-1,067,991**

Source: Euro Crisis Monitor, Institute for Empirical Economic Research, University of Osnabrueck and ECB

to the ECB[11], claims/liabilities arising from balances of Target2 accounts and claims/liabilities related to the allocation of Euro banknotes within the Eurosystem. The former component – the participating interest of the EANCBs in the ECB merits some clarification. The EANCBs contribute to the greater part of the ECB's paid-up capital. This is disclosed under 'Capital and Reserves' on the liability side of the ECB's balance sheet and offset against the 'Participating interest in the ECB' shown by each EANCB as an intra-Eurosystem claim. This item is not related to any form of interest paid to the NCBs by the ECB. The term 'participating interest' refers to the interest of the EANCBs to participate in the ESCB by subscribing to the capital of the ECB. The other two components of intra-Eurosystem claims/liabilities are discussed at length in the following Chapters of this thesis.

Tables 3.6, 3.7 and 3.8 present the data for the first three components for each of the EANCB over the 2006-2016 period. The latter component is dealt with in the following sub-section since it requires specific adjustments to the data.

3.1.2.4 Allocation of Euro Banknotes[12]

Euro banknotes issued by EANCBs are indistinguishable, as they do not carry a mark identifying the EANCB that issued them. Thus, the method used in the Eurosystem to account for cross-border banknote flows is to allocate each EANCB a share of the total Euro banknote issue outstanding at any time, on the basis of the Banknote Allocation Key[13]. This allocated value of Euro banknotes in circulation is reported as 'Item 1' on the liabilities side of the balance sheet of each EANCB.

The difference between the value of Euro banknotes allocated to the individual EANCBs (in accordance with the Banknote Allocation Key) and the banknotes the

[11] At the beginning of 1999, the EANCBs transferred foreign reserve assets (15 per cent gold and 85 per cent in foreign currency) to the ECB in accordance with Article 30 of the Statute of the ESCB. These claims are denominated in Euro at a value fixed at the time of their transfer.
[12] Guideline (EU) 2016/2249 of the ECB of 3 November 2016 (ECB/2016/34), OJ L 347, 20.12.2016, p. 3.
[13] The weight of each EANCB's banknote allocation key is the same as its 'capital key' multiplied by 92 per cent, the remaining 8 per cent being allocated to the ECB. For example, the Bundesbank has a capital key of 25.6 per cent and a banknote allocation key of 23.5 per cent (December 2016).

central bank actually puts into and withdraws from circulation gives rise to intra-Eurosystem claims or liabilities[14] (featuring in the EANCBs' balance sheet as Item 9.3 on the assets side or Item 9.2 on the liabilities side). Thus, the actual amount of Euro banknotes issued by a particular EANCB (Column 3, Table 3.9) is computed by summing up the allocation of Euro banknotes of that EANCB (Column 1, Table 3.9) and the intra-Eurosystem claims/liabilities related to Euro banknotes (Column 2, Table 3.9).

As an example of this calculation, at the end of 2011, while the amount of banknotes in circulation reported in the balance sheet of the central bank of Ireland stood at €13.0 billion, it had issued €15.4 billion more banknotes than its allocation. In fact, the actual amount of banknotes issued by the central bank of Ireland is calculated at €28.4 billion. In the case of Austria and, more recently, in the case of Portugal, when calculated as above, it resulted that more banknotes have been taken out of circulation than put into circulation (indicated by a negative figure for the actual banknotes in circulation). Details pertaining to this calculation as at the end of each year over the 2006-2016 period are presented in Table 3.9. For a detailed description of the balance sheet presentation of Euro banknotes refer to Handig and Holzfeind (2007) and Jobst et al, (2012).

Data for the claims/liabilities related to the allocation of euro banknotes within the Eurosystem (Column 2, Table 3.9) are used particularly in the analysis presented in Chapter 4, whereby an investigation is carried out to identify whether a relationship exists between this intra-Eurosystem adjustment and the Capital Key.

For the purposes of the analysis presented in Chapter 6, it was considered more appropriate to use the actual amount of Euro banknotes (compiled as explained above and presented in Column 3, Table 3.9) rather than the banknotes in circulation as published in the Annual Report of each EANCB (on the liabilities side of their balance

[14] A net liability related to the allocation of Euro banknotes within the Eurosystem arise when banknotes actually put into and withdrawn from circulation exceed the value of Euro banknotes allocated to the EANCB. If, however, the actual Euro banknotes in circulation is lower, a corresponding net claim arises.

sheet). Therefore, for a more meaningful analysis, the balance sheet of each EANCB is adjusted such that the 'statutory' banknotes in circulation calculated according to the Banknote Allocation Key is replaced by the actual amount calculated as explained above. This implies that the totals of each balance sheet are also recalculated (a more detailed explanation is presented in Chapter 6).

3.2 Concluding Remarks

While this dataset is the cornerstone of the analysis in this thesis and is therefore intended to lay the groundwork for my own investigations, it also provides a detailed breakdown of the balance sheets of all NCBs within the Eurosystem, which offers scope for use in a wide range of other empirical investigations. This dataset is therefore a contribution made available for other researchers.

Table 3.9 Developments in Banknotes in Circulation: 2006-2016

€bn	2006			2007			2008			2009			2010			2011		
	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)
Austria	16.8	-15.7	1.1	18.1	-18.7	-0.6	20.3	-13.6	6.7	20.6	-16.9	3.7	21.5	24.9	-3.4	22.7	-32.8	-10.1
Belgium	20.6	-22.2	-1.6	22.1	-23.9	-1.8	24.9	-22.8	2.1	25.8	-18.7	7.1	26.8	-18.5	8.4	28.3	-16.4	12.0
Cyprus							1.3	-0.1	1.2	1.5	-0.1	1.3	1.5	-0.3	1.2	1.6	-0.6	1.0
Estonia																2.1	-1.5	0.6
Finland	10.4	-3.9	6.5	11.1	-3.7	7.4	12.5	-4.2	8.4	13.3	-3.9	9.4	13.9	-3.4	10.5	14.7	-3.5	11.2
France	120.2	-63.5	56.8	128.9	-67.3	61.5	144.9	-75.6	69.3	151.2	-74.8	76.4	157.4	-76.5	80.9	166.2	-77.6	88.6
Germany	170.9	84.3	255.2	183.8	99.5	283.3	206.6	121.8	328.4	201.3	146.8	348.1	209.6	157.1	366.7	221.3	170.5	391.8
Greece	15.3	1.6	16.9	16.3	2.4	18.7	18.3	2.5	20.8	20.9	0.1	21.0	21.7	7.9	29.7	23.0	18.4	41.4
Ireland	7.5	9.4	16.8	8.0	12.3	20.3	8.9	14.4	23.3	11.8	13.7	25.5	12.3	15.0	27.3	13.0	15.4	28.4
Italy	105.5	14.2	119.7	112.2	16.2	128.5	126.2	13.3	139.5	132.8	10.4	143.2	138.3	7.1	145.4	146.0	7.6	153.6
Lithuania																		
Latvia																		
Luxembourg	1.3	39.8	41.1	1.4	44.8	46.2	1.6	51.0	52.6	1.9	58.7	60.6	1.9	65.0	66.9	2.0	70.0	72.0
Malta							0.7	-0.1	0.7	0.7	0.1	0.8	0.7	0.1	0.8	0.7	0.1	0.9
Netherlands	32.3	-8.5	23.8	34.9	-11.3	23.6	39.2	-15.4	23.8	42.4	-19.9	22.5	44.1	-22.9	21.2	46.6	-27.3	19.3
Portugal	14.3	-9.8	4.5	15.3	-12.3	3.0	17.3	-15.7	1.6	18.6	-17.9	0.7	19.4	-19.0	0.3	20.5	-21.8	-1.4
Slovakia										7.5	-2.8	4.6	7.7	-1.7	5.9	8.1	-0.9	7.2
Slovenia				2.9	-2.3	0.6	3.2	-2.4	0.8	3.5	-2.5	1.0	3.6	-2.5	1.2	3.8	-2.5	1.4
Spain	62.9	24.1	87.0	67.6	17.9	85.5	76.0	7.1	83.1	88.3	-7.7	80.6	91.9	-15.4	76.6	97.0	26.5	70.6
ECB	50.3	-50.3	-	54.1	-54.1	-	61.0	-61.0	-	64.5	-64.5	-	67.2	-67.2	-	71.1	-71.1	-
Eurosystem	628.2	-	628.2	676.7	-	676.7	762.9	-	762.9	806.5	-	806.5	839.7	-	839.7	888.7	-	888.7

Source: Annual Reports of the EANCBs and own computation

Table 3.9 (cont.) Developments in Banknotes in Circulation: 2006-2016

€bn	2012			2013			2014			2015			2016		
	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)	BN Item 1 (1)	Intra ES (2)	Actual BN (3)
Austria	23.3	-42.0	-18.7	24.5	-42.2	-17.7	26.2	-28.7	-2.4	27.8	-28.2	-0.4	28.9	-29.0	-0.1
Belgium	29.1	-13.7	15.4	30.6	-12.6	18.0	33.1	-12.7	20.4	35.1	-11.8	23.2	36.5	-9.7	26.8
Cyprus	1.6	-0.9	0.8	1.7	0.5	2.2	2.0	0.2	2.2	2.1	-0.4	1.7	2.2	-1.1	1.1
Estonia	2.1	-1.4	0.7	2.3	-1.4	0.8	2.6	-1.7	0.9	2.7	-1.7	1.1	2.8	-1.6	1.2
Finland	15.0	-3.2	11.8	15.8	-3.5	12.2	16.8	-4.0	12.8	17.8	-4.1	13.7	18.5	-3.9	14.6
France	170.6	-74.8	95.8	178.8	-76.8	101.9	189.5	-81.2	108.3	200.8	-88.0	112.8	208.7	-88.9	119.8
Germany	227.2	200.3	427.5	237.3	224.3	461.5	240.5	267.9	508.4	254.8	297.8	552.6	264.9	327.3	592.2
Greece	23.6	14.5	38.0	24.6	10.8	35.5	27.2	5.2	32.4	28.8	19.6	48.4	29.9	13.3	43.2
Ireland	13.3	15.9	29.3	14.1	16.5	30.5	15.5	16.0	31.5	16.4	16.3	32.7	17.1	16.9	34.0
Italy	149.9	-3.6	146.3	157.5	-12.9	144.7	164.5	-22.4	142.2	174.3	-32.3	142.0	181.2	-35.3	146.0
Lithuania										6.0	-3.8	2.2	6.1	3.6	2.5
Latvia							3.8	-3.1	0.7	4.0	-3.5	0.5	4.2	-3.9	0.2
Luxembourg	2.1	74.3	76.4	2.2	85.3	87.5	2.7	90.8	93.5	2.9	92.6	95.5	3.0	93.6	96.6
Malta	0.8	0.1	0.8	0.8	0.0	0.8	0.9	0.0	0.9	0.9	0.1	1.0	1.0	0.1	1.0
Netherlands	47.9	-30.6	17.3	50.2	-34.3	15.8	53.5	-39.9	13.6	56.7	-44.7	12.0	58.9	-47.4	11.5
Portugal	21.0	-25.0	-4.0	22.3	-28.2	-5.9	23.3	-31.9	-8.6	24.7	-35.1	-10.4	25.7	-37.6	-12.0
Slovakia	8.3	-0.2	8.2	8.7	0.1	8.7	10.3	-1.0	9.4	10.9	-0.9	10.1	11.4	-0.5	10.9
Slovenia	3.9	-2.6	1.4	4.1	-2.0	2.2	4.6	-2.1	2.5	4.9	-1.4	3.5	5.1	-0.7	4.4
Spain	99.6	-34.2	65.4	104.4	-47.2	57.1	118.2	-70.3	47.9	125.2	-83.7	41.5	130.1	-98.0	32.2
ECB	73.0	-73.0	-	76.5	-76.5	-	81.3	-81.3	-	86.7	-86.7	-	90.1	-90.1	-
Eurosystem	912.6	-	912.6	956.2	-	956.2	1,016.6	-	1,016.6	1,083.5	-	1,083.5	1,126.2	-	1,126.2

Source: Annual Reports of the EANCBs and own computation

Chapter 4

The True Size of the Eurosystem: New Insights from the Euro Area National Central Banks' Balance Sheets

How big is the ECB? According to the official data, the European Central Bank (ECB) represents only a very small fraction (one-tenth) of the reported balance sheet of the Euro Area system of National Central Banks (EANCBs), known as the Eurosystem. This Chapter argues that the effective size of the central institution of the Eurosystem, which is termed the "Mega-ECB", is significantly higher, and has grown even faster, than the reported balance sheet of the Eurosystem as a whole. The analysis in this Chapter points to strong evidence that most EANCBs (especially those of the larger countries) effectively act on autopilot as branches of this central institution.

The argument that the reported balance sheet of the Eurosystem understates the size of a greater institution because it nets off intra-Eurosystem balances is not new (see for example Whelan, 2012a and Tornell, 2012a). But the magnitude of this understatement has not as yet been quantified. This analysis starts by carrying out the quantification – the balance sheets of all the EANCBs are amalgamated into a new total for the Eurosystem referred to as the 'Eurosystem Total Assets' (ESTA). Subsequently, the relationships between the balance sheet of the entire system and those of the EANCBs are examined. It is the nature of this relationship that leads to refer to the concept of the "Mega-ECB".

This, however, presents a paradox. If evidence leads to advocating that most EANCBs act on autopilot, then their behaviour can be considered similar to branches of a greater entity – the "Mega-ECB". But, being branches of a greater entity allows for consolidation, thus, challenging the premise that the central institution of the Eurosystem is greater than the ECB. While this Chapter provides evidence of the EANCBs being branches of a greater entity, this paradox remains unresolved. Having identified this paradox, however, it poses a rather new question - only touched upon by a related issue raised by Buiter (2015) though in a different context - about the current structure of the Eurosystem: should the Eurosystem be turned into a conventional central bank with one single legal entity (the "Mega-ECB") and nineteen branches (the current EANCBs)? And who runs the "Mega-ECB"?

Based on the dataset presented in Chapter 3, this Chapter aggregates the EANCBs balance sheets to produce a new gross balance sheet of total Eurosystem assets (ESTA) that, in contrast to the official balance sheet data published by the ECB, does *not* net the intra-Eurosystem balances. This total has a number of key features:

- It is (unsurprisingly) distinctly larger, and has grown more rapidly than the official published figure.
- This alternative measure reveals a strong systematic relationship with the balance sheets of EANCBs, which suggests that these more or less run on autopilot: expanding their balance sheets closely in line with shares in the (ostensibly tiny) paid-up equity in the ECB. This relationship is much less evident in official published figures for the Eurosystem.
- Over the period for which data are presented, the lending behaviour of the "Mega-ECB" appears to have been driven primarily by the borrowing needs of the distressed countries of the EU's southern periphery.
- A strong relationship is also revealed between the alternative measure of the Eurosystem balance sheet and the loss absorption capacity of each EANCB implying that, despite some evidence of over and undercapitalization, to a large extent, the financial strength of EANCB is closely in line with their share in the ECB capital.

- The participation of the EANCBs in the purchase programmes of the ECB is also closely in line with their capital share. This is of interest since these purchase programmes account for a significantly high amount on the asset side of the balance sheet.
- The lack of autonomy of the EANCBs relative to the ECB is unsurprisingly more noticeable than that of the Federal District Banks vis-à-vis the Federal Reserve.
- These relationships lead one to view this alternative measure as the balance sheet of the "Mega-ECB" – a near-monolithic entity, whose balance sheet dwarfs that of the actual ECB.

The first part of this Chapter compiles a gross balance sheet of the Eurosystem through a simple amalgamation of all the nineteen individual EANCBs and the ECB – a detailed set of disaggregated accounts of the Eurosystem. This balance sheet is compared with the Eurosystem balance sheet as published by the ECB – a set of consolidated accounts of the Eurosystem. The new data show that the balance sheet of the Eurosystem as compiled in this way was significantly larger than that published by the ECB over the crisis period. This is because the ECB eliminates particular items on the balance sheet of the EANCBs, mainly related to intra-Eurosystem transactions, as part of the consolidation process and therefore these do not feature in the Eurosystem balance sheet.

Based on the data presented here, this Chapter then compares the distribution of total assets amongst the EANCBs and the distribution of the paid-up ECB capital. It shows that, for most EANCBs, their shares in the (tiny) capital of the ECB, to a very good approximation, drive their shares of total assets. In other words, the EANCBs appear to expand their balance sheet on auto-pilot, in line with their share of the capital of the ECB. This predictive power is striking, particularly as the paid-up capital of the ECB accounts for a mere 0.1 per cent of total assets. On this tiny fulcrum, the ECB achieves effective control of a massively larger balance sheet: thus this is referred to as the balance sheet of the "Mega-ECB". Strikingly, this relationship is distinctly

stronger for the large EANCBs while smaller EANCBs illustrate at least some degree of autonomy.

This Chapter also shows that if one examines the relationship between EANCB balance sheets and the published balance sheet of the Eurosystem, the relationship is distinctly weaker[15]. Nor indeed should this weaker relationship be surprising, since, as is also documented, the behaviour of intra-Eurosystem balances varies very substantially between countries.

This Chapter also examines some of the details of intra-Eurosystem transactions, as revealed by EANCB balance sheets. In particular, focus is set on the emerging pattern of lending and borrowing between countries as well as the relation between the different type of intra-transactions and the capital shares of the EANCBs.

This Chapter also provides further evidence to support the premise that EANCBs act on auto-pilot. Evidence points towards a strong relationship between the Loss Absorption Capacity[16] (as a measure of financial strength) of each EANCBs and their respective capital key. Participation by the EANCBs in the ECB's purchase programmes as part of the non-standard measures is also found to be closely in line with their shares in the ECB's capital.

Finally, a comparison is made with the Federal Reserve System, highlighting the relatively weaker degree of autonomy of the EANCBs, relative to the ECB, when compared to the behaviour of District Banks vis-a-vis the Federal Reserve.

[15] An econometric investigation of this relationship is carried out in Chapter 5.

[16] Buiter (2012a, 2015) defines the Loss Absorption Capacity as the sum of capital and reserves, the Revaluation Accounts and Provisions. He also presents two other more prudent measures for Loss Absorption Capacity. This subject matter is discussed in detail in Section 4.10.

4.1. The Paradox of the "Mega-ECB"

Since the onset of the financial crisis in 2007, despite their somewhat different focus, there has been a rapid ballooning of central banks' balance sheets: at their respective peaks, the Bank of England's balance sheet had grown by 398 per cent (Nov 2012), the Eurosystem's (as defined by the ECB) had grown by 196 per cent (Dec 2017); and the Fed's had grown by 421 per cent (Jan 2015). As explained earlier, in the existing literature on the central bank's balance sheet, such as in Borio and Disyatat (2009), Lenza, Pill and Reichlin (2010) and Pattipeilohy (2016), more attention has been paid to the published Eurosystem balance sheet in general than to the individual balance sheets of the EANCBs. A simple explanation for this may be the fact that, up till 2016, no detailed information was provided about the composition by country of the Eurosystem assets and liabilities besides the scattered dispersed information published by the individual EANCBs in their annual financial accounts. Indeed, by utilizing the new dataset in Chapter 3, this Chapter goes back to the original EANCBs' balance sheets, because only by looking at a breakdown of how the individual EANCBs and the ECB contribute to the consolidated Eurosystem balance sheet can one reveal important aspects of the Eurosystem balance sheet developments that otherwise remain concealed.

Having collated the data for each of the EANCBs' published balance sheets over the period 2006-2016, each of which includes data on intra-Eurosystem claims, one can aggregate to produce a new gross balance sheet of total Eurosystem assets. The summation of the total assets of all EANCBs and the ECB is referred to as 'Eurosystem Total Assets', in short, ESTA.

The official data published by the ECB differ from ESTA since they include a consolidation adjustment that nets out the intra-Eurosystem transactions. Indeed, Eurosystem total assets as published by the ECB are (unsurprisingly) significantly lower than the total derived by summing the assets of all the EANCBs and the ECB (refer to Table 4.1 and Figure 4.1).

Determining the 'true size' of the Eurosystem is paradoxical. The consolidation of the EANCBs (and the ECB) balance sheets to derive the Eurosystem balance sheet as published by the ECB has an interesting implication – by reporting the consolidated balance sheets of the EANCBs netting out the intra-Eurosystem transactions, the ECB is treating EANCBs as branches of a greater entity. However, this, in turn implies a paradox – the Paradox of the "Mega-ECB". While, through the consolidation process, the ECB is regarding the EANCBs as branches of a greater institution – the "Mega-ECB" - in its operations, the ECB, acts as if they still exist as separate entities, in which case consolidation is not appropriate.

Table 4.1 Eurosystem Total Assets/Liabilities

€bn	Eurosystem Total Assets/Liabilities as Published by the ECB^	Alternative Measure: ESTA*
2006	1,150.0	1,451.4
2007	1,507.9	1,891.5
2008	2,075.1	2,768.7
2009	1,903.0	2,494.4
2010	2,002.0	2,758.0
2011	2,733.3	3,905.0
2012	2,962.7	4,296.1
2013	2,273.3	3,347.0
2014	2,208.2	3,251.3
2015	2,780.5	4,070.7
2016	3,662.9	5,221.3

^Total assets as published by the ECB in the Annual Consolidated Balance Sheet of the Eurosystem, which comprises assets and liabilities of the Euro Area NCBs and the ECB after netting out claims and liabilities between Eurosystem central banks.

*Eurosystem Total Assets (ESTA) are calculated as the summation of the total assets of each EANCBs and the ECB as published in the financial statements of the respective Annual Reports (including claims and liabilities between Eurosystem central banks).

Source: Annual Reports of the National Central Banks and the ECB and own compilation

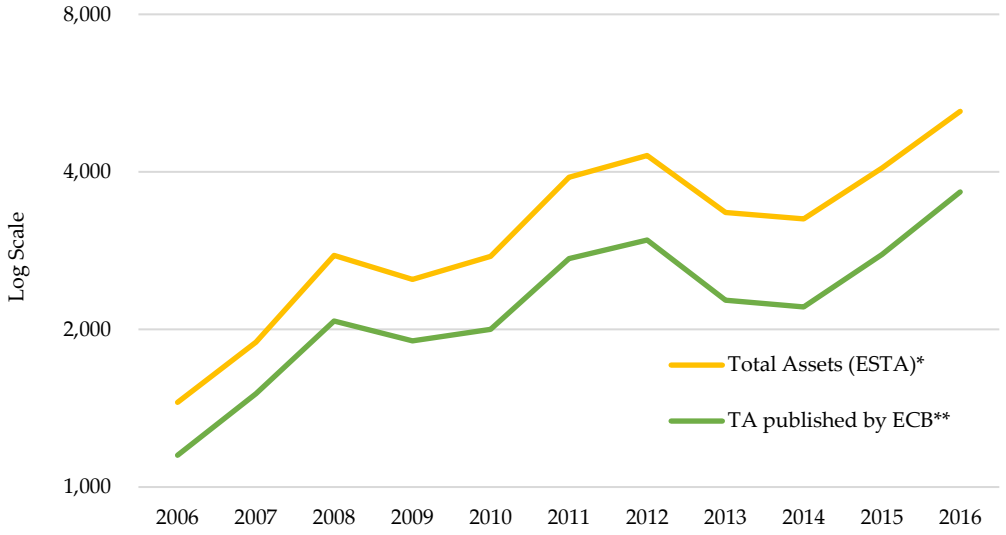
The paradoxical effect is also present when one advocates the ESTA definition. If the EANCBs are considered as separate entities (in line with the treatment by the ECB), then their accounts should not be consolidated leading to the new alternative measure – ESTA – to be the 'true size' of the Eurosystem balance sheet. However, if evidence can be gathered that the EANCBs act as local branches, leading one to posit the existence of a greater institution of the Eurosystem (greater than the ECB), then consolidation is defensible. But, in this case, does this "Mega-ECB" exist? While this paradox is not resolved yet, it is still intriguing to examine the relationship between the EANCBs, the ECB and the Eurosystem. This leads to identify interesting observations that contribute towards partly solving the puzzle but also pose further questions.

4.2 Eurosystem Total Assets (ESTA): an Alternative Measure

Despite the paradox discussed earlier, this alternative measure of the Eurosystem balance sheet merits further investigation. Figure 4.1 compares Eurosystem Total Assets (ESTA) as compiled in this Chapter with the Eurosystem Total Assets as published by the ECB over the 2006-2016 period. Unsurprisingly, aggregation of the individual balance sheets of the EANCBs results in a much larger total than that published by the ECB since the latter nets out intra-Eurosystem transactions. From a geographical distribution point of view, between 2006 and 2012, the ESTA almost tripled (in nominal terms), with the central bank of France, Germany, Italy, Spain and the Netherlands jointly contributing towards three-quarters of this expansion. In contrast, the ECB itself contributed to less than 4 per cent of the expansion of the ESTA.

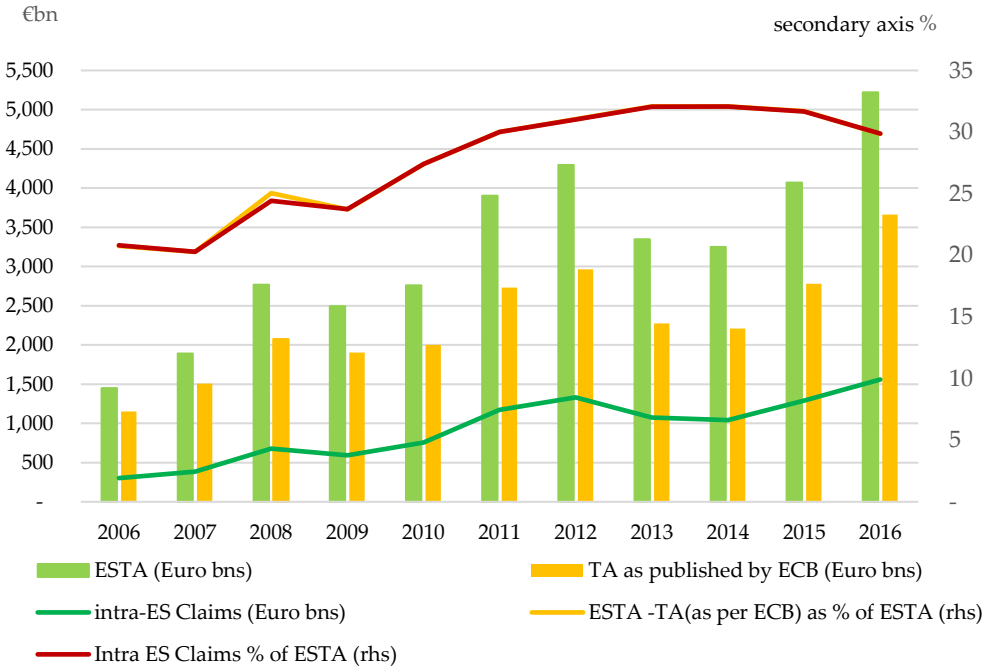
The ESTA measure of the Eurosystem balance sheet also grew more rapidly, by 231 per cent (Dec 2007-Dec 2017) compared to the growth of 196 per cent in the official published figure, cited earlier. Figure 4.2 shows that the percentage gap between the

Figure 4.1 Eurosystem Total Assets vs ECB Published Figures



* sum of EANCB's (and ECB's) Assets
** consolidated balance sheet as reported by the ECB

Figure 4.2 ESTA*, Total Assets as per ECB and Intra-Eurosystem Balances**



*sum of EANCBs' (and ECB's) Assets **consolidated balance sheets as reported by the ECB

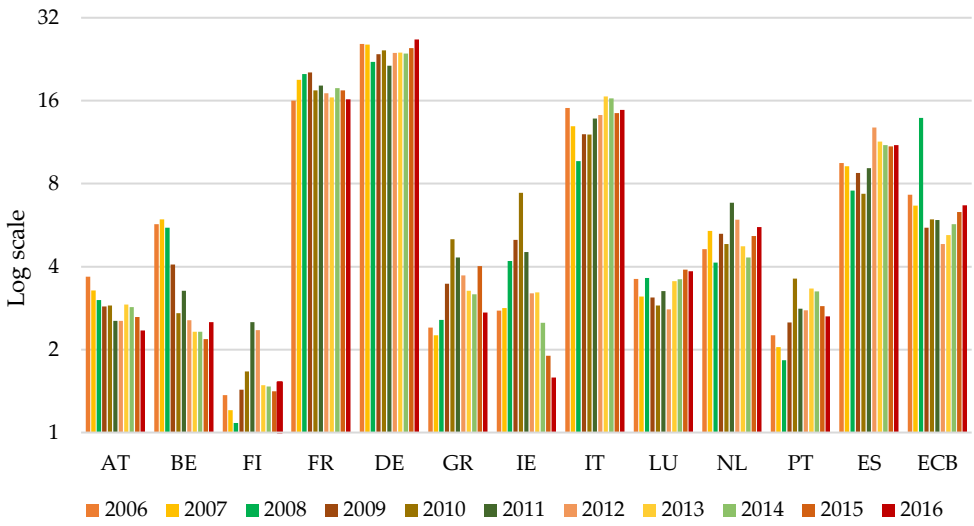
Note: The line 'ESTA-TA (as per ECB) as % of ESTA' is not visible (except in 2008) since it lies exactly on the line 'Intra-ES Claims % of ESTA'. This is the result of the fact that ESTA differs from the Eurosystem balance sheet published by the ECB by the netting of the intra-Eurosystem transactions.

two measures has expanded during almost the whole sample period, and is essentially entirely accounted for by intra-Eurosystem claims[17].

The logic of this difference was noted in Whelan (2012a): 'Target2 intra-Eurosystem balances disappear from the consolidated Eurosystem balance sheet, so the sum of all NCB balance sheets is greater than the Eurosystem balance sheet'; however the data have not until now been collated to allow a direct comparison between the two measures.

Also evident from Figures 4.1 and 4.2 is the fact that, while there is no doubt that the Eurosystem balance sheet expanded rapidly since 2007, the inclusion of intra-Eurosystem balances as a balance sheet item in the Eurosystem balance sheet (as compiled here) reveals a growing proportional gap between the two definitions of Eurosystem Total Assets. The nature of this expansion is investigated later on in this Chapter.

Figure 4.3 Share of EANCB's Total Assets in ESTA*



*share in ESTA defined as the sum of EANCBs' (and ECB's) Assets
NCBs of Cyprus, Estonia, Malta, Slovenia, Slovakia, Latvia and Lithuania do not feature in this figure since their share of total assets to ESTA is relatively small.

[17] The percentage gap between the two definitions of total assets registered a steady increase except for 2009 and 2016, when the gap was slightly lower than that noted in the previous year. In all years except 2008, intra-Eurosystem claims accounted for the entire difference between the two measures.

Figure 4.3 shows the share of each EANCB in the Eurosystem balance sheet (defined by ESTA). The striking stability of these shares, especially for the larger EANCBs is investigated further in Section 4.4.

Tornell (2012) provides a motivation for further analysis of ESTA. Notwithstanding that the Eurosystem balance sheet grew with a similar magnitude to that of other "main" central banks such as the Bank of England and the Fed[18], as Tornell (2012a) puts it: 'this aggregate number, however, masks a huge cross-country asymmetry: central bank domestic credit to private banks in the Eurozone periphery has increased massively'. Indeed, as illustrated in Figure 4.4, the domestic credit of EANCBs for Greece, Ireland, Italy, Portugal and Spain increased eight-fold from 2006 to 2012. This domestic credit creation has been financed by borrowing from other Euro Area NCBs facilitated by the Target2 mechanism – the leading European platform for processing large-value payments (see sub-Section 4.6.1 for a detailed description). Figure 4.4 shows a notable similarity between the increase in the EANCB domestic credit and Target2 liabilities[19]. Therefore, Tornell (2013) states that 'in order to analyse Eurozone dynamics, Target2 balances must be added as a new item in the standard textbook central bank's balance sheet':

Table 4.2 Stylized Balance Sheet of a National Central Bank in the Eurozone

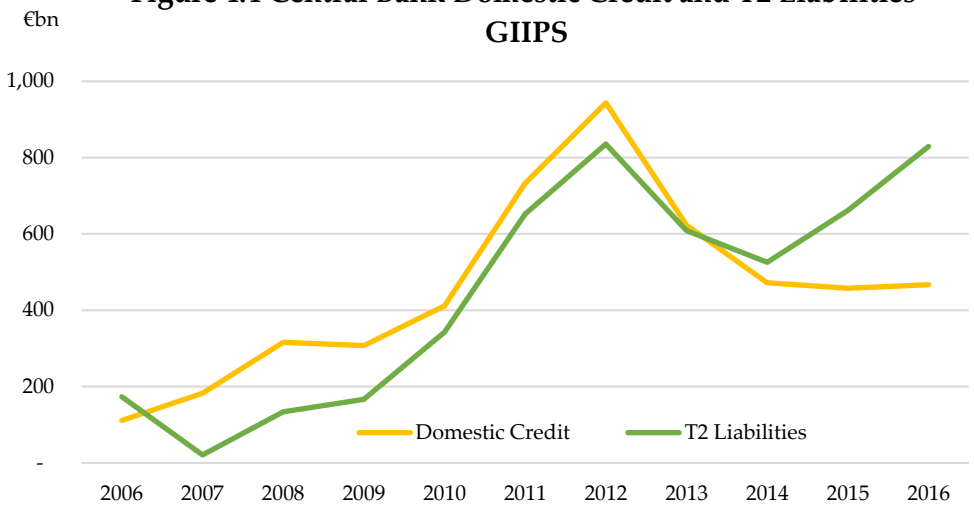
ASSETS	LIABILITIES
Credit to Domestic Agents	Money Balances
Gold and Reserves	Target2 Liabilities
Target2 Claims	

Source: Tornell (2013)

It is possible to 'unmask' this asymmetric behaviour only by digging deeper into the aggregate number.

[18] Such an expansion is even more accentuated if one follows the ESTA definition presented here.
[19] Target2 liabilities are defined by Tornell (2013) as: 'automatic loans from the Eurosystem to a national central bank within the Eurosystem.'

Figure 4.4 Central Bank Domestic Credit and T2 Liabilities
GIIPS



*negative positions on the balance sheets of the EANCBs vis-a-vis the ECB as the central counterparty
GIIPS: Greece, Italy, Ireland, Portugal and Spain

Appendix 4.1 presents the Eurosystem statistical balance sheet defined as ESTA between 2006 and 2016. As noted in Chapter 3, while some EANCBs publish their balance sheets on a monthly basis, other EANCBs publish their balance sheets on a quarterly or annual basis. Unless data are available for all the EANCBs on a monthly or quarterly basis, ESTA cannot be estimated at higher than annual frequency. The ECB started publishing a disaggregated Eurosystem balance sheet by country only since July 2016, and therefore, monthly data for the entire panel of EANCBs are available only for the last six months of the period under analysis (that is, July 2016 to December 2016). Consequently, ESTA, which is defined as the summation of all Total Assets, can be estimated for the period under analysis (Jan 2006 to Dec 2016) only on an annual basis.

The next sub-Section presents a comparison of ESTA and the ECB published data. Subsequently, Section 4.3 examines the 'Gross' approach that produces ESTA in relation to the current accounting conventions for group of companies and the public sector.

Despite the unresolved paradox discussed above, the alternative definition – ESTA – still provides new perspectives on the behaviour of EANCBs. In light of this, Section

4.4 observes the relationship between the share of total assets of each EANCB to the ESTA and their shares in the ECB's paid-up capital. Subsequently, the relationship between the EANCBs' balance sheets and the published balance sheet of the Eurosystem is also investigated.

4.2.1 The Difference between ESTA and the ECB Published Data

Prior to conducting further analysis on the basis of ESTA, this sub-Section presents a comparison of ESTA and the data published by the ECB. As explained earlier, the official data published by the ECB defines the Eurosystem as the total of the balance sheets of all the EANCBs and the ECB after including consolidation adjustments, the latter mainly pertaining to the netting of intra-Eurosystem transactions. In contrast, the alternative measure of the Eurosystem (ESTA) - a gross balance sheet of total Eurosystem - does not net intra-Eurosystem transactions but is a simple amalgamation of all the nineteen individual EANCBs and the ECB.

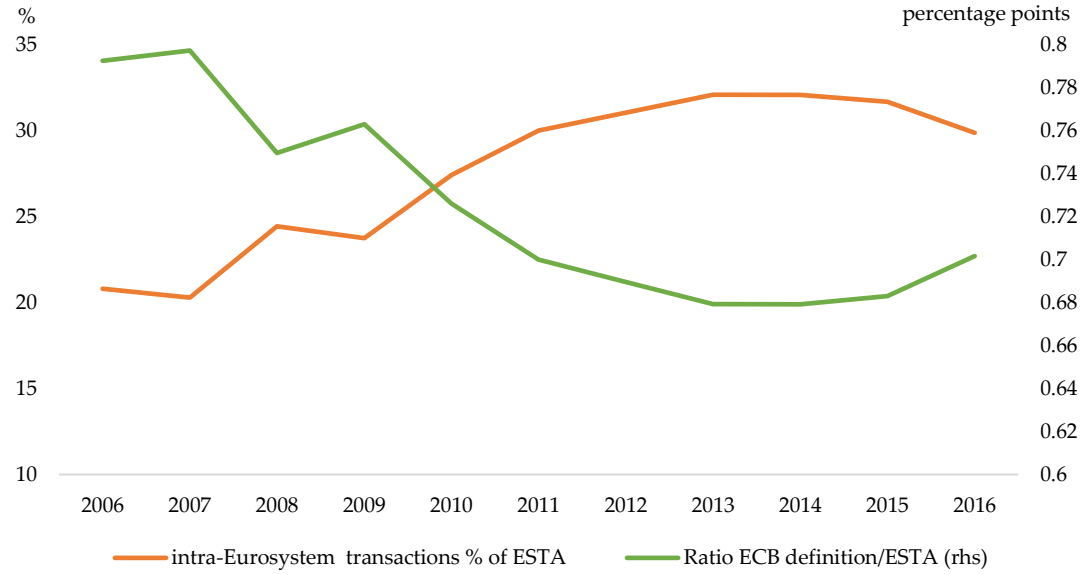
Table 4.3 ESTA and the ECB Published Data

€bn	Eurosystem Total Assets/Liabilities as Published by the ECB (1)	Alternative Measure: ESTA (2)	Ratio of ECB published data to ESTA (3)
2006	1,150.0	1,451.4	0.7924
2007	1,507.9	1,891.5	0.7972
2008	2,075.1	2,768.7	0.7495
2009	1,903.0	2,494.4	0.7629
2010	2,002.0	2,758.0	0.7260
2011	2,733.3	3,905.0	0.6999
2012	2,962.7	4,296.1	0.6896
2013	2,273.3	3,347.0	0.6792
2014	2,208.2	3,251.3	0.6792
2015	2,780.5	4,070.7	0.6831
2016	3,662.9	5,221.3	0.7015

Source: Annual Reports of the National Central Banks and the ECB and own compilation

Column 1 of Table 4.3 presents the Eurosystem total assets/liabilities as published by the ECB while Column 2 presents the Eurosystem total assets/liabilities calculated as the summation of the total assets of each EANCBs and the ECB as published in the respective financial statements in their Annual Reports, including claims and liabilities between Eurosystem central banks. The third column presents the ratio of the data published by the ECB to that in line with ESTA definition. It is evident that, over time, the difference between the two definitions widened with total assets as defined by the ECB, accounting for a smaller percentage of ESTA definition. In fact, whereas in 2006 total assets as published by the ECB were 80 per cent of ESTA, they decreased to around 70 per cent by 2016.

Figure 4.5 The Difference between ESTA and ECB Published Data



The ratio of Total Assets as defined by the ECB to ESTA followed a generally downward trend, highlighting the increasing important role of the main difference between these two definitions - the netting of intra-Eurosystem transactions, which as shown in Figure 4.5, increased over the crisis period as a ratio to ESTA. Indeed, intra-Eurosystem transactions increased their share in total assets (ESTA), from around 20 per cent in the beginning of the crisis to 30 per cent in 2016, in turn leading to the declining ratio of ECB definition of total assets to ESTA.

The main sub-component of these intra-Eurosystem balances is the net claims and liabilities of the Euro Area NCBs vis-à-vis the ECB as the central counterpart, known as Target2. As evident in Figure 4.12, this sub-component became even more prominent during the period of the crisis. Thus, when analyzing the difference between the balance sheet as published by the ECB and the alternative definition – ESTA - it is appropriate to focus on Target2. Indeed, by analyzing developments in Target2, one can shed light about the dynamics of the ratio between the two definitions of the balance sheet. Target2 is the subject matter discussed in other Sections of this Chapter namely Sections 4.6, 4.7, 4.8 and Section 4.9.

4.3 A Comparison of the Consolidated ECB Approach, the Alternative 'Aggregation' or 'Gross' Approach and the Current Accounting Practices for a Group of Companies and the Public Sector

As discussed earlier, an alternative approach to define the Eurosystem balance sheet is through the summation of the Euro Area National Central Banks' balance sheet (referred to as ESTA). While the Eurosystem balance sheet as published by the ECB nets out (consolidates) claims by one of its constituent central bank against another, the summation of these individual balance sheets presents the 'gross' position of the Eurosystem.

The ECB methodology of netting out all claims and liabilities between EANCBs, including the ECB, has the purpose of eliminating transactions that are not reflected in the accounts if the Eurosystem were a single entity unifying 19 central banks. In contrast, measuring the 'gross' position of the Eurosystem (the ESTA definition) serves a different purpose. The latter facilitates the understanding of the increasing role that developments in intra-Eurosystem transactions had in the expansions of the Eurosystem balance sheet during the recent financial crisis. These transactions served as a guide to identify the risks and the financial strain of Euro Area central banks that particularly relied on additional lending from other central banks.

While the 'gross' definition might be a better measure in terms of understanding the activity (particularly lending activity) that took place between the National Central Banks, its scope is to complement rather than to replace the Eurosystem balance sheet that nets out transactions between them (as published by the ECB). It is therefore, recommended that the Eurosystem balance sheet as published by the ECB is complemented by the presentation of the balance sheets of the nineteen Euro Area central banks (including their transactions with other national central banks) as well as the aggregation of these individual balance sheets into an alternative Eurosystem balance sheet. The latter becomes more relevant as the EANCBs are not officially branches of the "Mega-ECB" – a term used earlier to refer to the effective size of the central institution of the Eurosystem – and therefore consolidation is not appropriate.

At this juncture, it is interesting to compare the alternative treatment of intra-Eurosystem claims introduced in this thesis (the 'gross' approach) with the current accounting convention for treating intra-divisional claims and liabilities in a group of companies (sub-Section 4. 3.1) or in the public sector (sub-Section 4.3.2).

4.3.1 A Comparison of the ECB Approach, the 'Gross' Approach and the Current Accounting Practices for a Group of Companies

At the outset, it is important to note that such a comparison is not simple since the balance sheet of a central bank is different from the balance sheet of a corporation or group of companies. In particular, in the case of a central bank, besides reporting to meet the accountability requirements vis-à-vis the public and the stakeholders, reporting is also necessary to provide financial information for operational purposes such as the conduct of monetary policy. Nevertheless, supplementing the netting of intra-Eurosystem transactions with a 'gross' approach is similar to the standard practice for treating intra-divisional claims and liabilities in a corporation whereby both subsidiary accounts and holding company accounts are published.

According to the current accounting practice, in case of a group of companies whereby a parent company controls one or more subsidiary companies, the financial statements are presented as those of a single economic entity. It is for this reason that the preparation and presentation of consolidated financial statements requires entities to consolidate entities it controls, eliminating intra-group transactions and balances in the process. These consolidated accounts are appropriate since the subsidiary companies are owned by the parent company. However, besides consolidated accounts, groups also prepare individual accounts for the parent company and for each subsidiary. This is particularly the case with listed companies where the parent companies are obligated to a dual reporting – one at individual level, the other at group level.

In a group of companies, these different sets of accounts are used for different purposes. The consolidated accounts combine all the information from the subsidiaries under the parent's control. In contrast, the individual accounts show the position and the performance of each individual company. This is analogous to the Eurosystem. The consolidated balance sheet for the Eurosystem combines the positions of all central banks after adjusting for internal transactions while the individual balance sheets of the EANCBs show the performance of each individual central bank (including any intra-transactions).

According to the current standard accounting practice, the type of reporting, that is segmented or consolidated reporting, is chosen depending on the scope of the accounts. Thus, segmented reporting is very often used in the management of each subsidiary and for comparison between subsidiaries while the consolidated financial statements are used to compare the performance of the group over time. Similarly, the individual balance sheets of the NCBs (including intra-Eurosystem transactions) are used to analyze the situations related to that specific Euro Area national central bank while the consolidated Eurosystem balance sheet is used for analysis across time and in comparison with other central banks outside the Eurosystem.

In the case of a group of companies, consolidated accounts (parent and subsidiaries collectively) and/or segmented financial statements (parent and subsidiary accounts side-by-side) are reported. In the case of the Eurosystem central bank, there is also scope for publishing a non-consolidated or 'gross' balance sheet particularly during the financial crisis. From an economic point of view, it is considered valid to sum up the balance sheets of all EANCBs without allowing one individual NCB to net against the other. This will, for example, provide information on the actual need for borrowing by group of countries such as the periphery countries. In similar ways, aggregating the segments in line with the approach introduced in this thesis – the 'gross' balance sheet approach – might also be revealing when applied in case of group of companies. In particular, although it is not standard practice for group of companies to publish their balance sheets in line with the 'gross' approach introduced here, comparing the consolidated balance sheet with the 'gross' balance sheet may serve as a risk metric.

4.3.2 A Comparison of the Consolidated ECB Approach, the 'Gross' Approach and the Current Accounting Practices for the Public Sector

Another important comparison is that between the 'gross' approach adopted through the aggregation of the individual EANCBs balance sheets (ESTA) and the conventions applied in the case of public sector accounting. There is ample literature (such as Grossi, Mori and Bardelli, 2014; Santis, Grossi and Bisogno, 2018) advocating the fact that while Consolidated Financial Statements in the public sector represent useful financial tools to improve transparency and accountability toward internal and external users, this consolidated view is only a part of the information needed in order to offer the citizens and other stakeholders a clear view of a local government's impact.

Consolidated Financial Statements have been successfully introduced in a number of countries like the UK, Canada, USA, Australia, New Zealand, and Sweden both at the central and local levels of government. In the public sector, this statement is a useful

instrument for governments that deal with a large number of publicly-owned companies, because it presents a clear picture of the current economic status of the public corporate group.

On its own, this consolidated view does not allow to have segmented information, covering specific areas and policies of intervention for which it is appropriate to separately report financial information. (International Public Sector Accounting Standards (IPSAS) 18). This is even more important for local governments which tend to delegate a big part of their service production to decentralized entities, such as corporations, private contractors, and public and private partnerships.

There is strong empirical evidence that the adoption of consolidated and segmented reporting, particularly for local government, allows one to have both an overall view of the financial and economic performance of a public group seen as a whole and an analytical view in order to make appropriate strategic and operational decisions. Segmented reporting disaggregates consolidated information over economic sub-units and give a complete picture of the functions of the local authority. Disaggregated information helps the determination of factors influencing performance and the evaluation of the sustainability of the group in the medium-long term.

Considering the UK public sector, the UK produces segmental reporting – presenting the financial statements for the central government, the local government and public corporations individually. In contrast, the Whole of Government Accounts (WGA) published annually by the HM Treasury, consolidates the audited accounts of over 8,000 organisations across the public sector – including central and local government and public corporations such as the Bank of England – in order to produce a comprehensive, accounts-based picture of the financial position of the UK public sector. An entity's accounts will be consolidated into those of the parent Department and then into the WGA. Similarly, Gilts held by public sector entities are eliminated on consolidation. At face value, it seems that this approach is parallel to that adopted

for the Eurosystem as while the UK produces segmental reporting for different tiers of government, which are then aggregated into the WGA, the EANCBs publish their balance sheets individually and are aggregated into the Eurosystem balance sheet published by the ECB. However, there is one distinct point worth mentioning. The process of consolidating the Bank of England into the public sector accounts as described earlier is a valid one since the Bank of England is wholly owned by the British government. In the case of the Eurosystem, each individual EANCB is owned by the government of its respective country. Indeed, evidence presented in Chapters 4 and 5 suggest that the EANCBs act as individual entities as arms of their respective government in borrowing activity. On this basis, consolidation appears inappropriate.

As discussed earlier, in the case of a group of companies, the current accounting conventions require the reporting of consolidated financial statements (where intra-transactions are netted-out) supplemented by segment reporting. In this regard, there are clear advantages for releasing financial statements that eliminate intra-transactions. Reporting finances of a group of companies on a consolidated basis (including netting-out) help stakeholders to gather a clear idea of the financial health of the total enterprise. On the other hand, there are disadvantages with netting-out. The aggregate view provided by consolidated accounts that net-out transactions between entities within the same group gives only a part of the information needed for assessing the performance of each entity. In turn, this also contributes towards less informed judgements about the enterprise as a whole. Moreover, netting out does not allow for keeping each entity or department responsible for their activities and operations.

In the case of a system of central banks like the Eurosystem, a consolidated balance sheet (as published by the ECB) also provides ease of understanding and analysis of the Eurosystem as a whole. On the other hand, consolidated financial statements that net-out transactions between central banks may mask particular performance of individual EANCBs and therefore do not always give an accurate picture of the

financial health of the Eurosystem. Since during the consolidation process activity between central banks disappears, consolidated financial statements can give users a misguided sense of financial stability in the absence of 'gross' information. This disadvantage of netting-out was more accentuated when the large amount of funds transferred between EANCBs as a symptom of the financial crisis (through Target2) was obscured by the process of netting-out intra-transactions and therefore not revealed in the consolidated Eurosystem balance sheet published by the ECB.

In order to address this disadvantage, it is therefore recommended that in the case of a system of central banks such as the Eurosystem, apart from releasing the consolidated balance sheet of the Eurosystem as published by the ECB and the individual EANCBs' balance sheets, a financial statement that combines the individual balance sheets but does not net-out intra-transactions is also provided.

A further crucial argument for not netting out is provided in the remainder of this Chapter, and the econometric results of Chapter 5, which show that the 'gross' measure has superior predictive power in explaining EANCB's behavior.

4.4 Are Euro Area National Central Banks on Auto-Pilot? The Predictive Power of the ECB's Capital in Determining the Size of their Balance Sheets

As discussed earlier, if it is determined that EANCBs act as branches of a greater entity, then it will be more appropriate to consolidate the balance sheets of the individual EANCBs when computing the balance sheet for the entire system. Notwithstanding this, in practice, the ECB undertakes the consolidation process even though it treats the EANCBs as separate entities. Against this background, this Section conducts an analysis to determine whether the EANCBs act on auto-pilot by comparing the contribution of each EANCB towards Eurosystem total assets as defined by ESTA with their contribution towards the ECB capital.

Similar to any financially independent institution with its own legal personality, the financial endowment of the ECB is provided by its shareholders. However, the financial arrangements of the ECB are unique. Unlike any other central bank, the ECB's shareholders are the NCBs of all EU member states[20], with each NCB owning a share of the ECB's equity. In other words, pursuant to Article 28 of the ESCB Statute, the NCBs are the sole subscribers to and holders of the capital of the ECB[21]. The NCB's share of the ECB's subscribed capital is determined by the 'Capital Key'. Data pertaining to the Capital Key as officially published by the ECB and the necessary adjustments to compute the 'Adjusted Capital Key' – which is considered the true capital share of each EANCB which reflects the distribution of the fully paid-up capital rather than the fictional subscribed capital – are presented in Chapter 3.

Since the ESTA includes the summation of the total assets of all EANCBs as well as the total assets of the ECB, the latter was apportioned across the nineteen EANCBs in order to eliminate the ECB. This implies that the level of total assets for each EANCB was adjusted to include the apportionment of the ECB's assets. The adjusted total assets for each EANCB are therefore larger than the level published in their respective Annual Reports. This apportionment was necessary so that when the ECB is not included in the analysis the nineteen EANCBs assume a portion of the ECB's assets (as ECB part-owners) in order to reach the same level of ESTA. Details concerning this adjustment and the adjusted data for each EANCB are presented in Chapter 3.

According to the framework set by the European System of Central Banks (ESCB) and the ECB, very few components of the EANCBs' balance sheets are distributed amongst the central banks of the Euro Area members in line with their respective ECB capital key[22]. Indeed, for most of the components there is no formal regulation indicating the proportions in which the EANCBs contribute towards the Eurosystem

[20] In turn, these NCBs are fully or substantially owned by their respective governments.
[21] The Eurosystem NCBs are required to pay up their subscribed capital in full while the non-Euro Area NCBs pay up only a minimal percentage (3.75%) of their subscribed capital as a contribution to the operational costs of the ECB.
[22] The ECB's capital key is the mechanism for regulating the contribution of the ECB's foreign reserve assets, the allocation of its profits and losses, the allocation of the Eurosystem's monetary income and the allocation of the total euro banknote issue (Ingram, 2011).

total assets. If a relationship exists between the composition by country of Eurosystem total assets and the adjusted shares of the EANCBs in the ECB capital, it implies that the ECB capital, despite its relative small size, has the power to determine the size of the EANCBs balance sheet. In other words, the ECB's capital base, despite its miniscule size, has very strong predictive power. Notwithstanding its fundamental implications, literature on this issue, so far, remains rather scarce. Ingram (2011) hints on this subject matter in his contribution to the book *The Capital Needs of Central Banks*: 'it may be that (NCBs) balance sheet contents will gradually tend towards harmonization; their components will tend to be distributed across the Eurosystem's consolidated balance sheet more in line with their capital key shares'. This is, in fact, the subject matter investigated in this Section.

Figure 4.6 and Table 4.4 compare the shares of total assets of each EANCB to the total assets of the Eurosystem (ESTA) to the Adjusted Capital Key; while Figure 4.7 plots the actual and implied total assets for each EANCB separately (refer to Appendix 4.2 for detailed data).

The key features revealed by Table 4.4 and Figures 4.6 and 4.7 are:

- For most EANCBs, the Adjusted Capital Key is close to the share of total assets (ESTA).
- This relationship is distinctly stronger for the larger EANCBs.
- Even when the level of the share differs from the Adjusted Capital Key (as, most strikingly, for Luxembourg), the growth rates of most EANCB's assets still track the growth rate of ESTA quite closely.

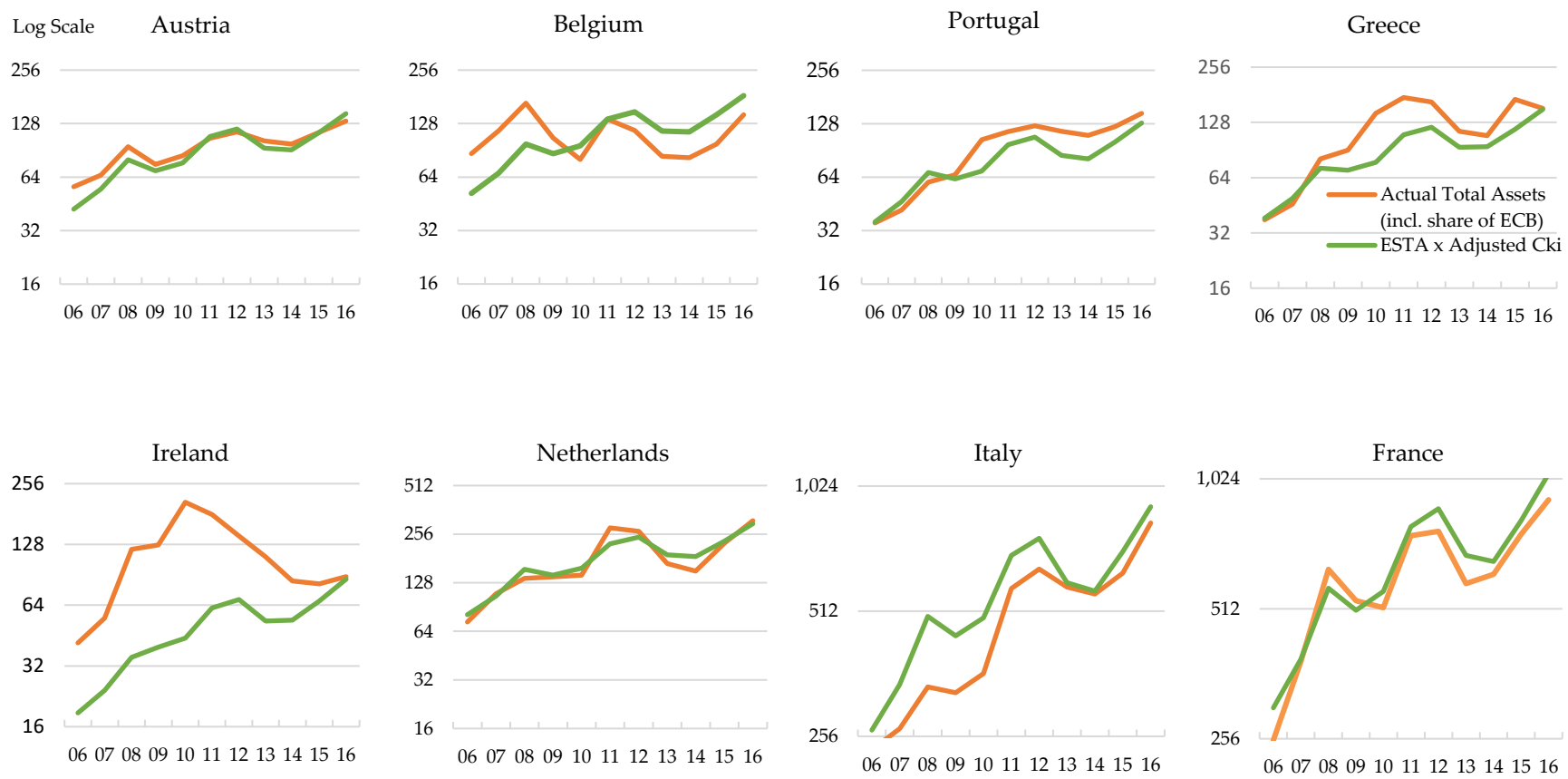
Table 4.4 shows that if the ratio of actual total assets of each EANCB to total assets of the Eurosystem (ESTA) is compared with the Adjusted Capital Key of each EANCB (implied shares of total assets), the differences are mostly quite small and stable. In the case of EANCBs such as France, Germany, Netherlands and Austria the discrepancy between the actual share of ESTA and the adjusted share of the ECB capital decreased over time up to 2015, though widened slightly again in 2016. In the

Table 4.4 The Actual Share of ESTA and the Adjusted Capital Key (ACK)

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual Share of ESTA	3.89	3.47	3.43	3.02	3.06	2.71	2.68	3.06	3.01	2.80	2.53
	ACK	2.91	2.90	2.89	2.78	2.78	2.78	2.78	2.78	2.81	2.79	2.79
BE	Actual Share of ESTA	5.96	6.18	6.03	4.26	2.91	3.48	2.72	2.51	2.52	2.41	2.75
	ACK	3.57	3.55	3.55	3.48	3.48	3.47	3.47	3.48	3.54	3.52	3.52
CY	Actual Share of ESTA			0.41	0.55	0.44	0.40	0.36	0.44	0.37	0.31	0.28
	ACK			0.18	0.20	0.20	0.20	0.20	0.19	0.22	0.21	0.21
EE	Actual Share of ESTA						0.09	0.11	0.14	0.20	0.18	0.15
	ACK						0.26	0.26	0.26	0.28	0.27	0.27
FI	Actual Share of ESTA	1.50	1.33	1.33	1.53	1.77	2.62	2.44	1.58	1.57	1.52	1.64
	ACK	1.80	1.79	1.79	1.80	1.80	1.79	1.79	1.79	1.80	1.78	1.78
FR	Actual Share of ESTA	17.51	20.45	22.84	21.41	18.67	19.36	18.01	17.49	18.92	18.72	17.54
	ACK	20.80	20.70	20.64	20.38	20.38	20.32	20.32	20.32	20.26	20.14	20.14
DE	Actual Share of ESTA	27.89	27.54	26.21	25.08	25.95	23.05	25.17	25.34	25.17	26.47	28.39
	ACK	29.57	29.52	29.44	27.13	27.13	27.06	27.06	26.97	25.72	25.57	25.57
GR	Actual Share of ESTA	2.60	2.43	2.92	3.63	5.19	4.48	3.85	3.42	3.34	4.20	2.92
	ACK	2.65	2.61	2.61	2.82	2.82	2.81	2.81	2.80	2.91	2.89	2.89
IE	Actual Share of ESTA	2.87	2.92	4.37	5.10	7.51	4.61	3.28	3.31	2.60	2.00	1.70
	ACK	1.29	1.28	1.27	1.59	1.59	1.59	1.59	1.60	1.66	1.65	1.65
IT	Actual Share of ESTA	16.39	14.12	12.15	13.07	13.13	14.86	15.06	17.50	17.32	15.54	15.99
	ACK	18.26	18.03	17.98	17.91	17.91	17.86	17.86	17.91	17.59	17.49	17.49
LU	Actual Share of ESTA	3.63	3.13	3.67	3.10	2.91	3.27	2.82	3.56	3.62	3.92	3.87
	ACK	0.22	0.23	0.23	0.25	0.25	0.25	0.25	0.25	0.29	0.29	0.29
MT	Actual Share of ESTA			0.11	0.14	0.14	0.10	0.09	0.11	0.14	0.12	0.11
	ACK			0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
NL	Actual Share of ESTA	5.04	5.77	4.91	5.58	5.18	7.16	6.20	5.03	4.64	5.53	5.94
	ACK	5.59	5.60	5.59	5.71	5.71	5.70	5.70	5.70	5.72	5.69	5.69
PT	Actual Share of ESTA	2.44	2.21	2.17	2.65	3.77	2.96	2.90	3.47	3.39	3.03	2.80
	ACK	2.47	2.47	2.46	2.51	2.51	2.50	2.50	2.54	2.49	2.48	2.48
SK	Actual Share of ESTA				1.07	0.98	0.75	0.62	0.71	0.77	0.64	0.61
	ACK				0.99	0.99	0.99	0.99	0.99	1.10	1.10	1.10
SI	Actual Share of ESTA		0.47	0.40	0.43	0.34	0.29	0.32	0.35	0.36	0.28	0.28
	ACK		0.46	0.46	0.47	0.47	0.47	0.47	0.47	0.49	0.49	0.49
ES	Actual Share of ESTA	10.29	9.99	9.05	9.40	8.05	9.81	13.37	12.00	11.77	11.72	11.89
	ACK	10.88	10.86	10.83	11.90	11.90	11.87	11.87	11.87	12.63	12.56	12.56

Source: own computation

Figure 4.6 Actual Total Assets (ESTA) vs Implied Total Assets for each EANCB*



*Malta does not feature in this Figure given its relatively small size.

Figure 4.6 (cont.) Actual Total Assets (ESTA) vs Implied Total Assets for each EANCB

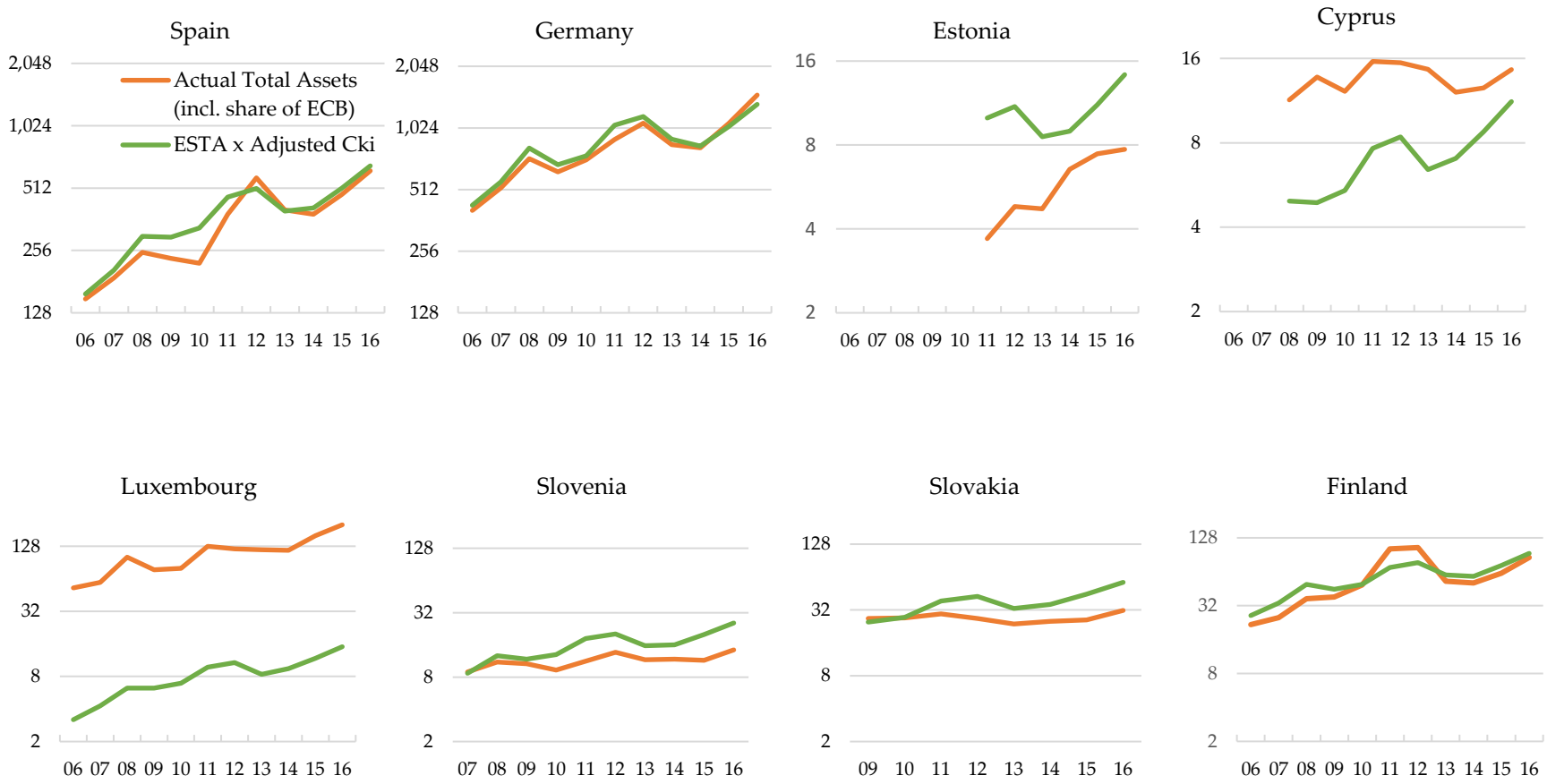
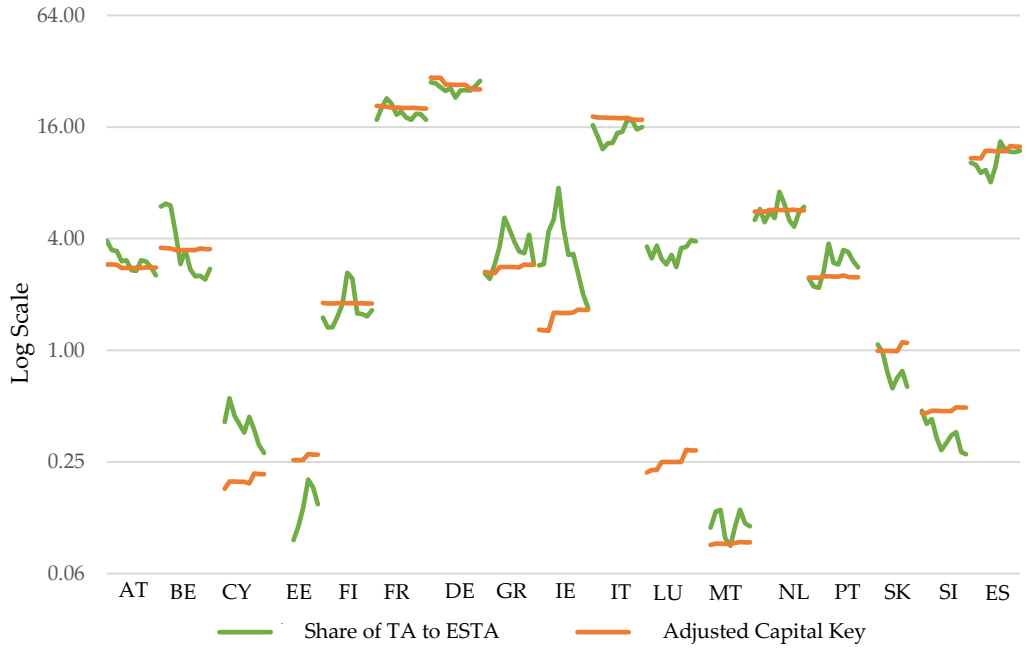


Figure 4.7 Shares of ESTA* vs Adjusted Capital Key 2006-2016**



*shares of EANCBs' Total Assets to ESTA (sum of EANCBs' and ECB's Total Assets)
**shares of EANCBs in the ECB paid-up capital rebased after exclusion of non-EA NCBs
Each EANCB line consists of eleven data points representing each year between 2006 and 2016

case of the central banks of Portugal, Ireland, Greece, Spain, Italy and Finland, the two ratios widened for the first few years of the crisis but got closer again over the more recent years as the crisis subsided. Luxembourg stands out as an outlier – while the actual share of ESTA stood around 3.5, the adjusted share of ECB capital for Luxembourg was around a quarter of a percentage point, over the 2006-2016 period.

It is evident from Figures 4.6 and 4.7 that the correlation between EANCB shares of ESTA and the Adjusted Capital Key is distinctly higher for the larger EANCBs. This implies that as the balance sheet of the Eurosystem defined as ESTA expands, the relatively large EANCBs expand in line. In contrast, the smaller is the EANCB the weaker is the correlation between the ratio of total assets and the respective Adjusted Capital Key. For instance, as the central banks of Germany, France and Italy are the largest three ECB owners, Figure 4.6 shows that their level of total assets follow the level implied by the capital key very closely. The behaviour of the relatively large EANCBs being distinct from that of the relatively small EANCBs may be explained by the fact that their behaviour reflects the common good of the unified whole. On

the other hand, as the behaviour of the relatively small EANCBs will not lead to any material consequence on the 'greater institution' they can act more like free riders. The more significant deviations by the relatively smaller EANCBs between their actual total assets and that implied by the Adjusted Capital Key may indicate some level of autonomy in their behaviour which is not evident in case of the larger EANCBs.

It is clear that a close, albeit not perfect, relationship exists between the share of total assets of the EANCBs to ESTA and their adjusted share of the ECB capital in case of nearly all the EANCBs.[23] This result is even more striking since the paid-up capital of the ECB constitutes an extremely small proportion of the ESTA[24], a mere 0.1 per cent. This implies that the activities of the EANCBs are driven by their adjusted share of the ECB capital; shedding doubt on whether EANCBs have any discretion to determine the size of their own balance sheets.

The conclusion from this relationship is that to a quite good approximation the EANCBs are effectively operating on auto-pilot: expanding their balance sheets in line with the total balance sheet of what is therefore referred to as the "Mega-ECB". Observing that the EANCBs act on auto-pilot leads one to consider the EANCBs as branches of a 'greater entity' in which case their balance sheets should be consolidated into one balance sheet of the greater entity - bringing us back to the paradox referred to earlier.

[23] This result is strongly supported by econometric investigations presented in Chapter 5.
[24] The total balance sheet size of the ECB stood at €349.0 billion at the end of 2016, implying a ratio of paid-in capital (as of end-2016) to total assets of 2 per cent. In turn, the total assets of the ECB constitute almost 7 per cent of the Eurosystem total assets (ESTA).

4.5 The Predictive Power of the ECB's Capital in Determining the Size of the EANCBs' Balance Sheets when intra-Eurosystem Transactions are Eliminated - the Weaker Link

This Section investigates whether a relationship exists between the capital key and the distribution of the Eurosystem total assets among the EANCBs when the intra-Eurosystem transactions are eliminated in the process of consolidating total assets for the Eurosystem[25] as published by the ECB.

As identified earlier, a relationship exists between the contribution of each EANCB towards Total Assets of the Eurosystem (ESTA) and their respective adjusted share in the ECB capital. In this Section, a similar investigation is carried out to determine whether such a relationship remains evident when intra-Eurosystem balances are not taken into account. In other words, a comparison is made between the share of consolidated Total Assets as published by the ECB after deducting intra-Eurosystem claims for each EANCB[26] and the respective Adjusted Capital key. An examination of such a relationship is only possible on the basis of the collection of the dataset described in Chapter 3, since, prior to 2016, the ECB used to publish only the consolidated Eurosystem balance sheet and not a disaggregation for each EANCB.

As discussed in the previous Sections, the difference between the Eurosystem Total Assets published by the ECB and that calculated by summing up all the balance sheets of the EANCBs and the ECB is entirely accounted for by intra-Eurosystem claims. This latter item comprised around 21 per cent of total assets in 2006 but grew up to 31 per cent by 2016 (Figure 4.2), which also explains the widening in the divergence between the two datasets for the Eurosystem balance sheet.

[25] All claims and liabilities between Eurosystem central banks, including the ECB, are netted out and are not presented at all in any of the Eurosystem's consolidated financial statements published by the ECB.
[26] Based on the definitions explained earlier, the summation of Total Assets less intra-Eurosystem claims for each EANCB is equal to Total Assets as published by the ECB in the consolidated Eurosystem balance sheet.

Figure 4.8 Actual Total Assets (excluding intra-ES balances) vs Implied Total Assets (excl. intra-ES balances) for each EANCB

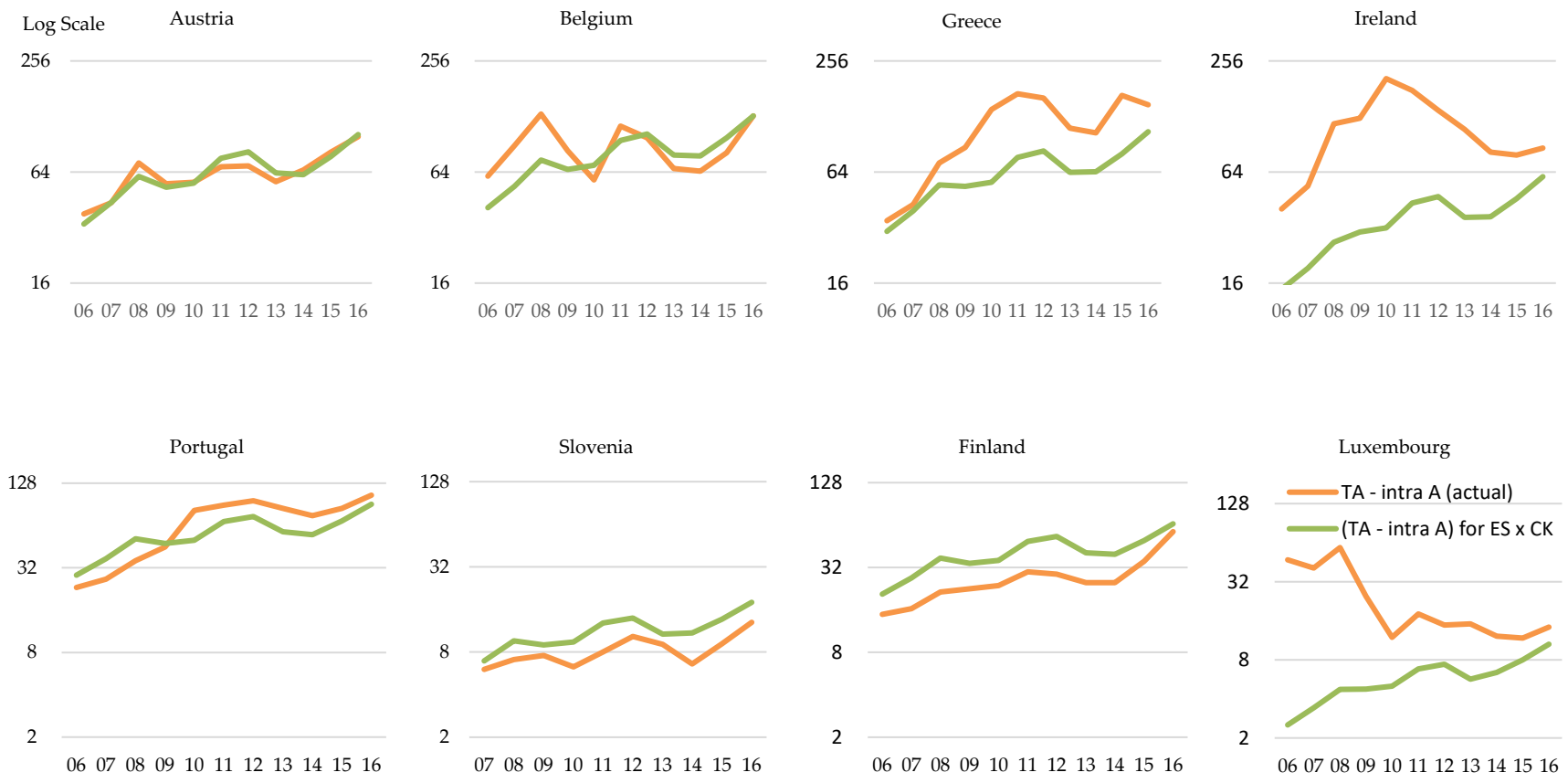


Figure 4.8 (cont.) Actual Total Assets (excluding intra-ES balances) vs Implied Total Assets (excl. intra-ES balances) for each EANCB

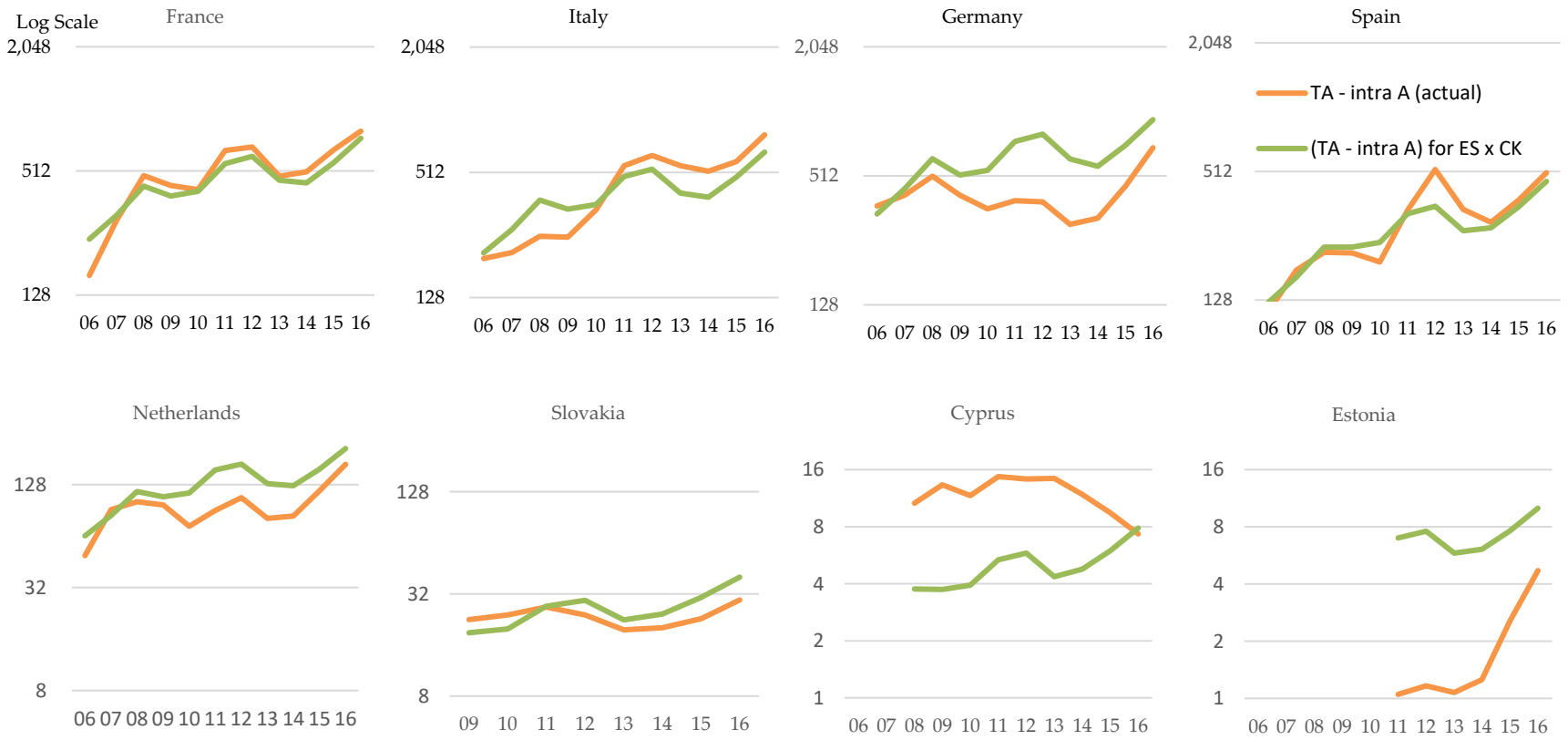
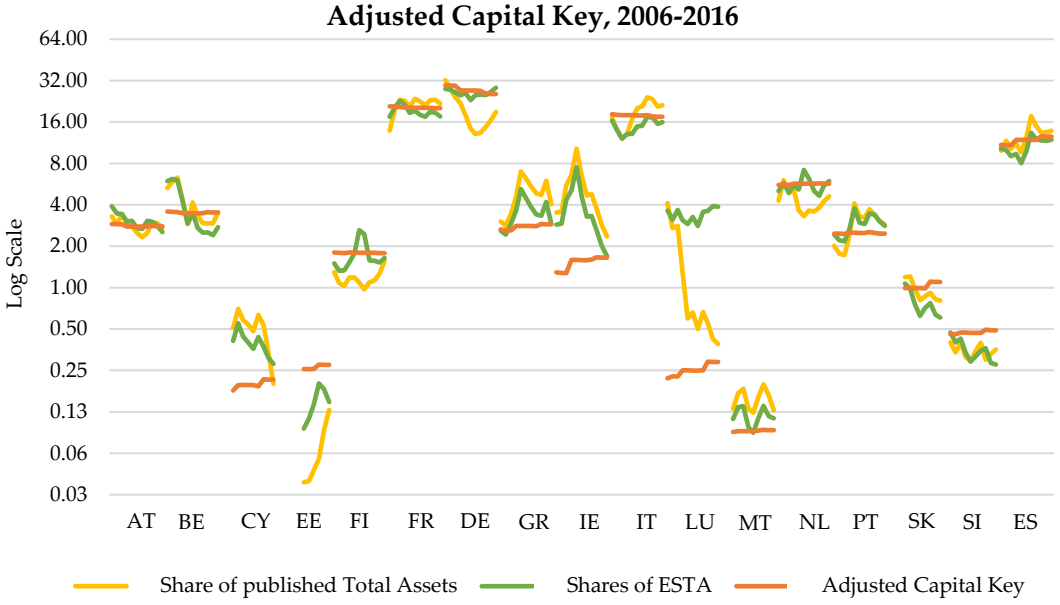


Figure 4.9 Shares of published Total Assets and Shares of ESTA vs Adjusted Capital Key, 2006-2016



Based on the same methodology as that applied in Section 4.4, a comparison is made between the actual total assets less intra-Eurosystem claims of each EANCB with those predicted by applying the adjusted capital share of each EANCB to the ESTA less intra-Eurosystem claims[27] for the 2006-2016 period. Therefore, in contrast to the earlier analysis, the intra-Eurosystem balances are here consolidated.

As evident in Figure 4.8, the shares of actual total assets less intra-ES claims and the Adjusted Capital Key for each EANCB are close or get closer over time in most of the cases. This observation is similar to that made earlier in the case of TA (including intra-ES claims). However, it is noteworthy, that in the case of Germany, Greece and Italy, the divergence between their share of actual total assets excluding intra-ES claims and their respective capital key widens over time. In the case of Germany, the share of total assets (excl. intra-ES claims) fails to sustain the level recorded prior to the crisis, which was relatively close to the Germany's adjusted share of ECB capital. In contrast, in 2016, in the case of Italy and Greece, the share of their assets (excl. intra-ES claims) exceeded their respective adjusted share in the ECB capital (see Figure 4.8 and Figure 4.9).

[27] Based on the methodology applied earlier, the ESTA less intra-Eurosystem claims is calculated as the summation of total assets of all EANCBs plus an apportionment of the ECB Total Assets less the summation of the intra-Eurosystem claims of all EANCBs and the ECB.

At this juncture, it is interesting to analyse how the exclusion of intra-ES claims from total assets affects the closeness of the share of total assets to the adjusted share of the ECB capital. If one were, therefore, to compare the observations presented in Section 4.4 to those presented here, it is evident that, with some exceptions, total assets including intra-ES claims follow the adjusted share of the ECB capital markedly more closely than when intra-ES claims are excluded. Most noticeable is the case of Germany. As the central bank of Germany's total assets accounted for 28.4 per cent of ESTA in 2016, the bank's adjusted share of the ECB capital stood at close to 25.6 per cent. However, when intra-ES claims are excluded, the share of total assets declined to 16.5 per cent in 2015 and 18.9 per cent in 2016. That is, as shown below, the Bundesbank very sharply increased its lending to other EANCBs. This implies that the central bank of Germany sustained a share of total assets in line with its Adjusted Capital Key but this relationship is disguised when intra-ES claims are consolidated. In contrast, a minimal level of intra-ES claims on the balance sheet of the central bank of Greece explain the fact that, by 2016, the share of total assets exceeded the Adjusted Capital Key for Greece when intra-ES claims are excluded.

Based on the above observations, one can conclude that, the underlying relationship identified earlier is disguised when intra-ES claims are consolidated (that is, in line with the ECB's definition of the Eurosystem).

4.6 The Predictive Power of the ECB's Capital in Determining the Size of the sub-Components of Intra-Eurosystem Claims/Liabilities of EANCBs

Having described how the summation of all the EANCBs and the ECB balance sheet (the ESTA) differs from the Eurosystem balance sheet published by the ECB, this Section focuses on the impact of intra-Eurosystem transactions on the balance sheet of individual EANCBs[28]. As noted in Chapter 2, most of the literature discusses only one particular sub-component of these intra-Eurosystem balances, namely Target2.

[28] As this Section focuses on the balance sheets of the EANCBs as published in their Annual Reports, the issue raised earlier concerning the Paradox of the "Mega-ECB" is not relevant here.

Nevertheless, as considerable balances may arise in the other sub-components, an investigation of all the main sub-components of these intra-Eurosystem balances is carried out in sub-Section 4.6.2. Such investigation examines whether the distribution of these main sub-components amongst the EANCBs follow the share of the ECB's capital held by each EANCB. Data pertaining to the intra-Eurosystem balances as well as to their sub-components are described and presented in Chapter 3.

4.6.1 An Anatomy of Intra-Eurosystem Transactions

As discussed earlier, the balance sheet item 'intra-Eurosystem claims/liabilities' do not feature in the Eurosystem consolidated balance sheet published by the ECB. However, this item appears on the EANCBs' balance sheets and is therefore included in the Eurosystem balance sheet compiled in this Chapter as the aggregation of the EANCB's balance sheets. For this reason, the sum of all the EANCBs' balance sheets is greater than the Eurosystem balance sheet as published by the ECB. This observation, which was also noticed by Whelan (2012a), is evident graphically in Figure 4.1 above which compares the ESTA (the sum of the EANCBs balance sheets) and the consolidated Total Assets – as published by the ECB.

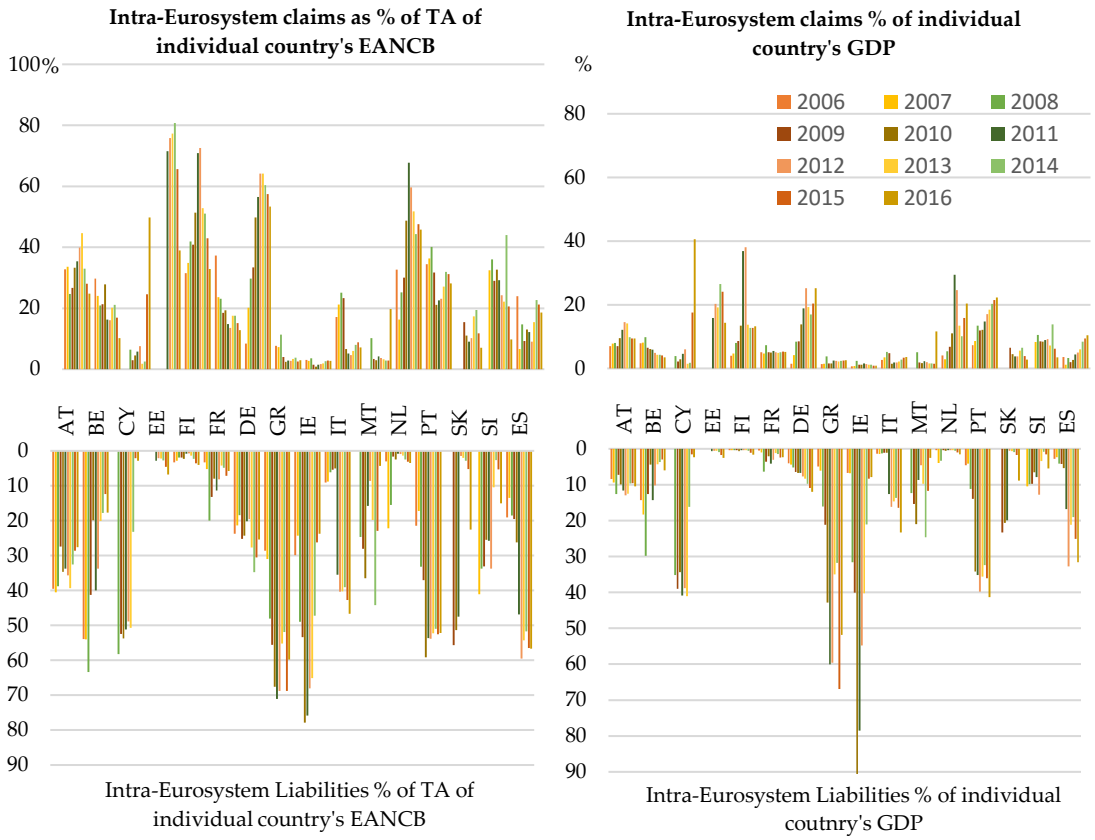
Since the beginning of the global financial crisis, the size of the EANCBs' balance sheets has changed substantially. A closer look at the EANCB's balance sheets reveals the role that developments in the intra-Eurosystem claims/liabilities had in these balance sheet expansions. In particular, the size of the balance sheet of the Bundesbank (as measured by total assets), which represents around one quarter of the total Eurosystem balance sheet, more than tripled between the end of 2006 and the end of 2016. A closer look at the balance sheet reveals that around ninety per cent of this expansion was attributed to the intra-Eurosystem claims by the Bundesbank. Similarly, the size of the balance sheet of the central bank of Netherlands more than quadrupled over the same period, with half of this expansion reflecting increases in intra-Eurosystem claims.

The counterpart of these developments on the Bundesbank's and the Netherlands central bank's balance sheets are the periphery's intra-Eurosystem liabilities. Indeed, a large increase in intra-Eurosystem liabilities financed almost three quarters of the expansion on the balance sheet of Greece, which more than quadrupled during the 2006-2016 period. Similarly, the balance sheets of the central bank of Italy tripled while that of Portugal and Spain quadrupled, financed by a robust expansion in their intra-Eurosystem liabilities.

For ten of the Eurosystem's NCBs, intra-Eurosystem claims/liabilities are the largest item on the balance sheets either on the asset side or on the liabilities side. By the end of 2016, this balance sheet item totalled more than one and a half trillion euros in aggregate claims or aggregate liabilities, equivalent to roughly 14 per cent of Euro Area GDP, more than quadrupling since 2006. Figure 4.10 shows that the intra-Eurosystem claims of both Germany and the Netherlands' central banks comprised around half of their balance sheet over the past recent years, or around twenty per cent of their GDP at the end of 2016. On the liabilities side, it shows that the intra-Eurosystem liabilities were around half the size of the balance sheets of the central banks of Greece, Italy, Portugal and Spain at the same point in time.

Figure 4.10 also shows that each EANCB balance sheet includes an intra-Eurosystem balance on the asset side as well as an intra-Eurosystem balance on the liability side. However, typically, an EANCB has either mostly intra-Eurosystem claims or mostly intra-Eurosystem liabilities. Figure 4.11 shows the net intra-Eurosystem balance (intra-Eurosystem claims less intra-Eurosystem liabilities) which is equivalent to the netting-out of the top panel of Figure 4.10 with the corresponding bottom panel. For most EANCBs, the net intra-Eurosystem balance remains significant when compared to their respective total assets. The balance sheets of the central banks of Germany, Finland and the Netherlands reveal a net intra-Eurosystem balance (claims) equivalent to more than one quarter of their balance sheets. On the other hand, net intra-Eurosystem liabilities are very large in the case of the central banks of Greece,

Figure 4.10 Intra-Eurosystem Balances*

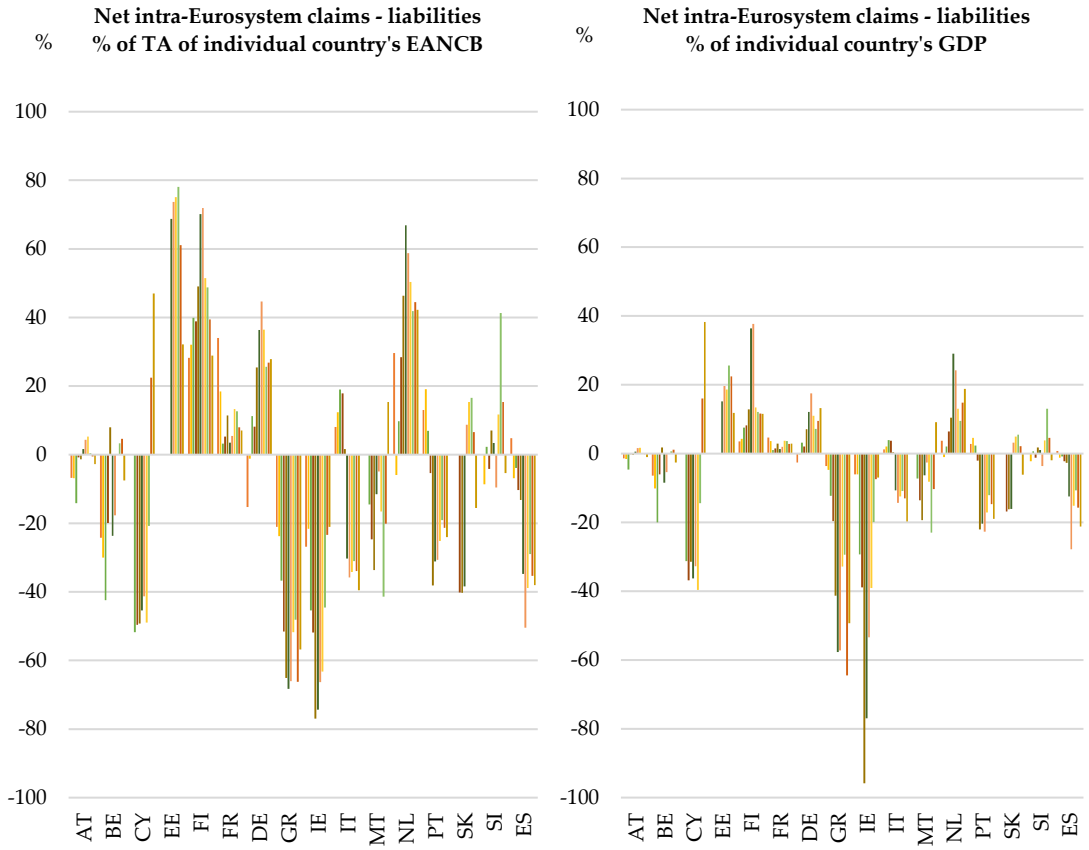


*Being an outlier, Luxembourg does not feature in this Figure.

Italy, Spain and Ireland (approaching 100 per cent of GDP at its peak). It is noteworthy, however, that Ireland's net intra-Eurosystem liabilities peaked very early (in 2010) while Greece's grew over a longer timeframe to 2015.

The offsetting of intra-Eurosystem claims and intra-Eurosystem liabilities may conceal important interpretations of developments in intra-Eurosystem claims/liabilities. Moreover, intra-Eurosystem claims/liabilities are made up of more than one component and therefore, intra-Eurosystem claims/liabilities may materialize due to different reasons. This implies that an investigation of the sub-components of the intra-Eurosystem balances merits consideration and is therefore the subject matter of the following sub-Section.

Figure 4.11 Net Intra-Eurosystem Balances*



*Being an outlier, Luxembourg does not feature in this Figure.

4.6.2 The Relation between the Share of the Main Components of the Intra-Eurosystem Balances and the EANCBs' Share in the ECB Capital

The focus has, thus far, been on total intra-Eurosystem balances. In this sub-Section, the composition of these balances is examined in more detail. Intra-ES balances comprise:

i) the participating interest of the EANCB in the ECB[29]

ii) the EANCB's euro-denominated claims arising from the transfer of foreign exchange reserves to the ECB

[29] This sub-component of intra-Eurosystem claims, which is shown on each of the EANCBs' balance sheet, reflects their respective contribution towards the greater part of the paid-up capital of the ECB. This item is not related to any form of interest received or paid and neither to seigniorage income.

iii) claims/liabilities related to the allocation of euro banknotes within the Eurosystem (net)[30] and

iv) claims/liabilities arising from balances of TARGET2 accounts.

While the first two sub-components – participating interest in the ECB[31] and transfer of foreign reserves[32] are recorded as an asset on the EANCBs' balance sheet, the other two sub-components – adjustment of banknotes in circulation and Target2 balances – appear on either the asset side or the liabilities side of the EANCBs' balance sheet. This has two important implications:

First, as highlighted earlier, the fact that a sub-component/s of intra-Eurosystem balances may appear on either the asset side or the liabilities side implies that looking merely at the net intra-Eurosystem claims or net intra-Eurosystems liabilities disguises distinctly different patterns in the components listed above. In particular, for Belgium, Italy, Portugal and Spain significant intra-Eurosystem claims partly offset intra-Eurosystem liabilities. In contrast, France's, Germany's and Luxembourg's intra-Eurosystem claims were diluted by intra-Eurosystem liabilities; while in the case of Austria intra-Eurosystem claims were almost equal to intra-Eurosystem liabilities, resulting in a minimal net intra-Eurosystem position (see Figure 4.10 and Figure 4.11). In sum, gross and net intra-Eurosystem balances are strongly, but imperfectly, correlated.

Second, the reasons why intra-Eurosystem claims and intra-Eurosystem liabilities arise and fluctuate can vary extensively amongst EANCBs. As noted earlier, most of the existing literature consider only Target2 as the main reason for raising intra-Eurosystem claims/liabilities while, in contrast, the literature considering the other

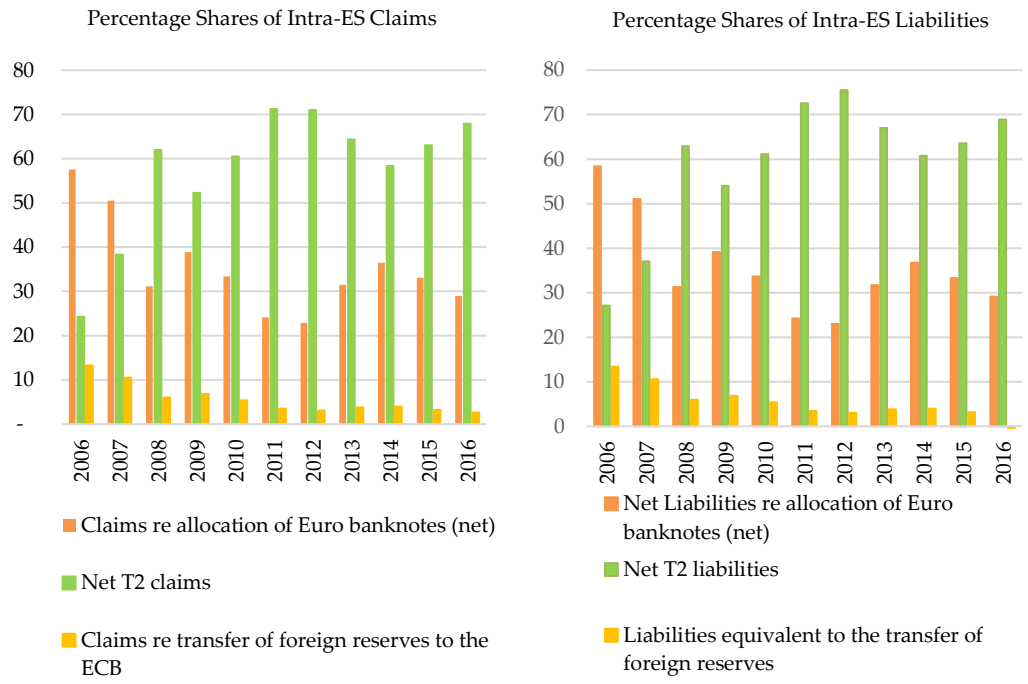
[30] The adjustment of banknotes in circulation represents the difference between the banknotes physically issued by a given EANCB and the share of all circulating euro banknotes that has been assigned to that EANCB according to a specific key. Details pertaining to this adjustment are presented in Chapter 3.
[31] This balance sheet item mainly comprise the share of each EANCB in the capital of the ECB – the capital key. Details pertaining to this item are presented in Chapter 3.
[32] This item, which is recorded on the asset side of the EANCBs balance sheet, reflects transfers of foreign exchange reserves to the ECB. An equivalent amount is recorded as an intra-Eurosystem liability on the ECB balance sheet.

sub-components is scarce. This makes it even more relevant to investigate the sub-components to understand the core reasons for developments in the intra-Eurosystem balances.

Figure 4.12 shows that the adjustment of banknotes in circulation and Target2 positions comprise the two main sub-components of total intra-Eurosystem balances.[33] The share of net claims/liabilities related to the adjustment of banknotes in circulation decreased as net T2 claims/liabilities became more prominent.

As noted earlier, intra-Eurosystem claims/liabilities for different EANCBs may be very similar, but for fundamentally different reasons. Jobst, Handig and Holzfeind (2012) provide examples relevant to this point – while Greece built-up intra-Eurosystem liabilities by raising negative Target2 balances, Germany recorded intra-Eurosystem liabilities prior to 2007 in the form of a liability arising from the adjustment of banknotes in circulation. (The latter is discussed further below.)

Figure 4.12 Components of Intra-Eurosystem Balances (percentage shares)



[33] The two panels of Figure 4.12 are virtually identical but differ slightly due to small statistical discrepancies between the totals of intra-ES claims and liabilities.

Moreover, Jobst, Handig and Holzfeind (2012) draws on the case of Austria to highlight that intra-Eurosystem positions may reflect other intra-flows such as the adjustments of euro banknotes in circulation. This emphasises the point that looking at the other sub-components is a pre-requisite not only to understand the source of intra-Eurosystem claims/liabilities but also for a correct interpretation of Target2 balances.

Looking at the data for these sub-components by country (see Figure 4.14 and Figure 4.15), one can draw on various other examples similar to the ones highlighted by Jobst, Handig and Holzfeind (2012) mentioned earlier. For instance, while France recorded net intra-ES claims on the basis of claims related to the allocation of euro banknotes, Luxembourg built-up intra-ES claims through positive T2 balances. Meanwhile, intra-ES claims recorded on the balance sheet of the central bank of Netherlands reflects both claims related to the adjustment of banknotes in circulation as well as net T2 claims. Similarly, on the liabilities side, net Eurosystem balances for France consist entirely of T2 liabilities while for Luxembourg net Eurosystem balances reflected liabilities related to the allocation of euro banknotes.

Accounting for more than one-third of Eurosystem total assets, the importance of intra-Eurosystem claims as an item on the EANCBs balance sheet is certain. Moreover, the role of intra-Eurosystem balances as a means to disguise the relationship between total assets and the capital key cannot be ignored. It is therefore interesting to investigate the relationship between the main sub-components of intra-Eurosystem claims/liabilities[34] and the Adjusted Capital Key.

One of the main sub-components of intra-Eurosystem balances constitute the net claims and liabilities of the Euro Area NCBs vis-à-vis the ECB as the central counterpart. These arise through cross-border payments settled in central bank money of the respective national banking sectors or the EANCBs themselves and are

[34]The participating interest in the ECB and the EANCB's euro-denominated claims arising from the transfer of foreign reserves to the ECB together accounted for a less than 1 per cent of total assets in 2016 and around 3 per cent of intra-ES claims and are therefore not considered in this analysis.

executed through the common euro area payment platform known as Target2. Through Target2, EANCBs can borrow from or lend to other EANCBs[35].

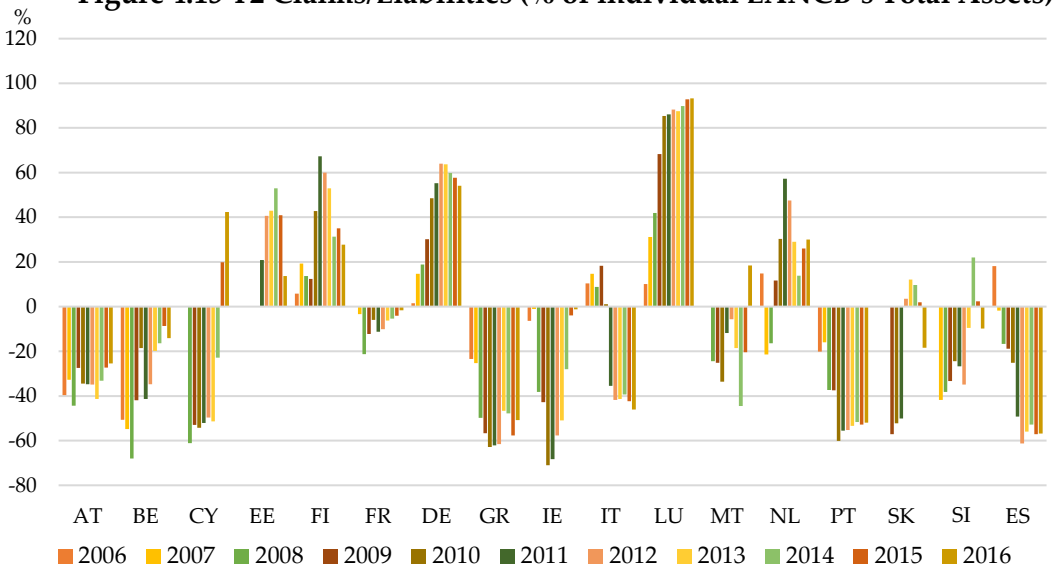
Prior to the start of the financial crisis in 2007, T2 balances were small in magnitude and mostly reflected differences in payment habits across countries. Since the onset of the crisis in mid-2007, however, T2 balances have become more pronounced. Indeed, balances of most countries increased significantly and peaked in 2012, declining slowly thereafter before peaking again in 2016. For instance, the T2 balance of the central bank of Germany reached a peak of €754 billion at the end of 2016, roughly equivalent to 25 per cent of Germany's annual GDP. The central bank of Italy, which had net T2 claims of €23 billion in 2008, had a net T2 liabilities of €357 billion by the end of 2016. Similarly, the central bank of Spain's T2 liabilities reached €328 billion at the end of 2016 from a surplus of €25 billion in 2008 (Figure 4.13). The renewed widening of T2 imbalances since 2015 is linked to the implementation of the ECB Asset Purchase Programme[36] (Castillo and Varela, 2017). Though in a slightly different context, these developments are discussed further in Chapter 6.

Although as noted earlier, EANCBs can borrow from or lend to other EANCBs, no bilateral data is available in this regard. Data on the balances of Target2 accounts arising from the stock of claims or liabilities for each EANCB, as described above and presented in Figure 4.13, on aggregate, show the extent to which one EANCB is lending or borrowing from the other EANCBs. However, no information is disclosed as to the identity of the institutions borrowing from, for example, Germany or lending to Italy and Spain.

[35]A Target claim on a EANCBs balance sheet means that overall there has been a net inflow of euro payments to that country's banking system; in case of a Target liability, a net outflow has taken place.

[36] According to the ECB, the Bundesbank and the Bank of International Settlements (BIS), the implementation of the APP cause a direct impact on T2 balances as it could involve cross-border payment by the purchasing EANCB as securities could be bought from a range of counterparties. On the other hand, the central bank of the Netherlands attaches the renewed rise in the T2 balances to the sustained fragmentation and risk perceptions within the Euro Area. There is an ongoing debate on this issue particularly concerning the recent surge of T2 liabilities in Italy (Dor, 2016).

Figure 4.13 T2 Claims/Liabilities (% of individual EANCB's Total Assets)



A controversial debate in the literature evolved on the likely causes and consequences of this sharp increase in Target2 balances. While some maintain that the high balances pose a problem (Sinn and Wollmershauser, 2011), others interpret them as merely a by-product of the banking and sovereign debt crisis (Buiter et al, 2011; Auer, 2012 and Jobst, 2009). Most literature points towards the premise that T2 balances reflect the high strains in the financial markets (De Grauwe and Ji, 2012) while others consider Target2 balances as a consequence of current account imbalances (Sinn and Wollmershaeuser, 2011).

The fact that T2 balances became highly negative for EANCBs in countries experiencing financial strain like Greece, Italy, Portugal and Spain and highly positive in countries where payments were inflowing like Germany[37], contributed towards an escalated debate. In this context, a common viewpoint on T2 balances has been that they represent a 'bailout' for the periphery countries and interpret the accumulation of balances by the German central bank as 'lending funds to strapped governments' (Tornell and Westermann, 2011). In contrast, others oppose this view and interpret T2 balances as a side effect of monetary policy decisions rather than as

[37] For an explanation of the main reason of the dramatic increase in the T2 liabilities of most peripheral European countries and the coincidental increase in Germany's T2 claims see Dullien and Schieritz (2012).

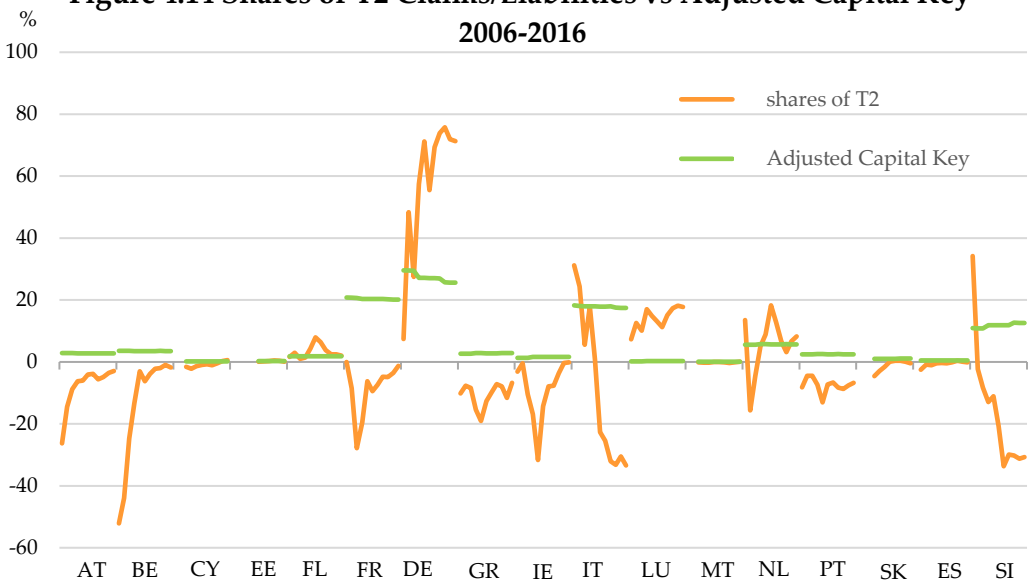
a bailout requested by national governments (Whelan, 2013). This latter view is supported by the ECB (2015) who declared that T2 balances 'do not provide a complete picture of the net financial flows between countries'.

Being one of the main forms of lending[38] during the Eurozone crisis, another branch of literature on this subject examined the relationship between T2 liabilities and developments in the sovereign bond market. De Grauwe and Ji (2012) observed both graphically and through a regression strategy, that, for the period after 2008, high government bond yields were associated with large T2 liabilities, and low government bond yields with large T2 claims. Similarly, Steinkamp and Westermann (2012) observe a close relationship between lending (80 per cent of which is made up of T2 balances) and the interest rate spread (as well as bond prices) in the recent sovereign debt crisis in Europe. This link between the spreads[39] and T2 balances may be explained by the notion that sovereign bondholders sell bonds of distressed countries pushing up their government bond yields and buy bonds of countries they trust lowering the bond yields. In turn, distressed countries are associated with relatively high T2 imbalances while safer countries are characterised by T2 claims. The relationship between T2 and sovereign bond yield spreads is discussed further in the following Section.

The same methodology presented earlier is applied to identify whether a relationship exists between the share of T2 claims/liabilities (for each EANCB) to total T2 claims/liabilities and the respective Adjusted Capital Key[40]. As displayed in Figure 4.14, at the end of 2016, a large positive German claim accounted for over 70 per cent of total T2 claims while its share in ECB capital stood at a much lower 26 per cent. Similarly, the aggregate T2 balance for Greece, Italy, Portugal and Spain accounts for

[38] T2 is considered lending by the markets because it is collateralized to a large extent by the country government bonds (see Steinkamp and Westermann (2012), Sinn and Wollmershauser (2011)).
[39] Spreads are usually defined as the differences between 10-year government bond rates of a country and that of German government bond.
[40] In cases when an EANCB records T2 claims (rather than T2 liabilities), the share is calculated as a ratio of the summation on T2 claims (taking into account only EANCBs with T2 claims). Similarly, when an EANCB records T2 liabilities, the share is calculated as a ratio of total T2 liabilities (ignoring EANCBs with T2 claims).

Figure 4.14 Shares of T2 Claims/Liabilities vs Adjusted Capital Key 2006-2016



around 80 per cent of the total net T2 liabilities of EANCBs. However, these countries together own only a quarter of the ECB capital. This is suggestive of the conclusion that no relationship exists between the share of net T2 claims/liabilities to total T2 claims/liabilities and the share of ECB capital for each EANCB.

The other main sub-component of intra-Eurosystem claims/liabilities relate to the allocation of euro banknotes in circulation and account for around one-third of total intra-ES claims/liabilities of the Eurosystem. Euro banknotes are issued by all Euro Area NCBs. However, for accounting purposes, the ECB reports 8 per cent of total banknotes in circulation in its own balance sheet while the remaining 92 per cent are presented in the balance sheets of the EANCBs in proportion to their paid-up shares in the capital of the ECB (the banknote allocation key). Thus, the difference between the net amounts of banknotes put into circulation by the individual EANCBs and the amounts of banknotes allocated to them (on the basis of the banknote allocation key) gives rise to intra-Eurosystem claims or liabilities. If the share of net value of banknotes put into circulation by an EANCB is higher than its share based on the banknote allocation key, that EANCB reports a corresponding net liability arising from the allocation of euro banknotes in circulation within the Eurosystem. If an

EANCB issues fewer banknotes than that, it accumulates a net claim[41]. This procedure and the data pertaining to net claims/liabilities related to the allocation of euro banknotes within the Eurosystem for each EANCB is presented in Chapter 3.

During the 2006-2016 period, the Bundesbank recorded an increasing share of net liabilities related to the allocation of euro banknotes[42]. In fact, for Germany, this share increased from 50 per cent in 2006 to around 70 per cent by 2016. Meanwhile, France, Netherlands, Portugal and Spain recorded increasing net claims related to the allocation of euro banknotes.

Being the world's number one country in the use of cash (Weidmann, 2016), it is not surprising that the central bank of Germany not only reported an intra-ES liability related to the allocation of euro banknotes, but the share of this balance sheet item to the total for all EANCBs (70 per cent in 2016) significantly exceeded Germany's share of the ECB capital (26 per cent). This implies that the banknotes in circulation in Germany were significantly higher than the amount allocated on the basis of the banknote allocation key. Jobst et al, (2012) distinguish two main reasons why this may take place – international travel and foreign exchange trading services. Though this merits further investigation, these channels seem to be plausible reasons for the relatively high level of banknotes in circulation, which led to a share of net liabilities related to the allocation of euro banknotes significantly exceeding the share of the ECB capital in Germany. Note issues in Greece and Ireland are also higher than their allocation, in the latter case also leading to a net liability that exceeds the Irish share of the ECB capital (Figure 4.15).

Also noteworthy is the fact that although the central bank of Luxembourg owns a mere 0.3 per cent of the ECB capital, it holds 21 per cent (2016) of total net liabilities related to the allocation of euro banknotes therefore putting a substantially high level

[41]These procedures are set out in 'Decision of the European Central Bank on the issue of euro banknotes' (ECB/2010/29); Official Journal of the European Union L35, 9 February 2011, page 26.
[42]Total liabilities related to the allocation of euro banknotes is calculated as the summation of the net liabilities related to the allocation of euro banknotes on the EANCBs balance sheet (see Table 3.9 in Chapter 3).

Figure 4.15 Shares of Allocation of Euro Banknotes and Adjusted Capital Key* 2006-2016

of banknotes in circulation. Though this is quite difficult to attribute to one particular explanation, one reason may be the large number of residents of neighbouring countries who work, and may withdraw cash, in Luxembourg. The Netherlands, Austria and Portugal place a lower amount of euro banknotes in circulation than their allocation, resulting in net claims on their central bank's balance sheets. Together, they account for one quarter of the total net claims related to euro banknotes despite that they hold only less than ten per cent of the ECB capital. The central bank of France issued a significantly lower amount of euro banknotes than allocated particularly in the early years of the financial crisis.

To conclude, the share of net claims/liabilities related to the allocation of euro banknotes seem to be uncorrelated with the EANCBs adjusted capital share. The existent literature identified a number of channels that may be responsible for the migration of banknotes issued by each EANCB. The EANCBs do not have control of this movement of currency since the issuance of euro banknotes is entirely demand-driven. This may lead to an EANCB to use more than its allocation such as Germany,

Greece and Ireland or underuse their allocation such as Spain and Portugal. Irrespective of whether the EANCBs under or overutilise their allocation of euro banknotes (leading to either net claims or net liabilities related to euro banknotes in circulation), it seems that there is no relation between the magnitude at which they diverge from their allocation and their share of ECB capital (see Figure 4.15).

Having discussed the alternative measure of the Eurosystem balance sheet (ESTA), the following Sections examine the drivers of expansions in ESTA as compared to growth in the Eurosystem balance sheet as published by the ECB. In particular, Section 4.7 observes how credit spreads drive T2 and hence ESTA. Subsequently, the extent to which macroeconomic considerations and country-specific debt crisis triggered the expansions in ESTA and in the ECB published balance sheet is discussed in Section 4.8 and Section 4.9.

4.7 ESTA, Target2 and the Sovereign Bond Yield Spreads

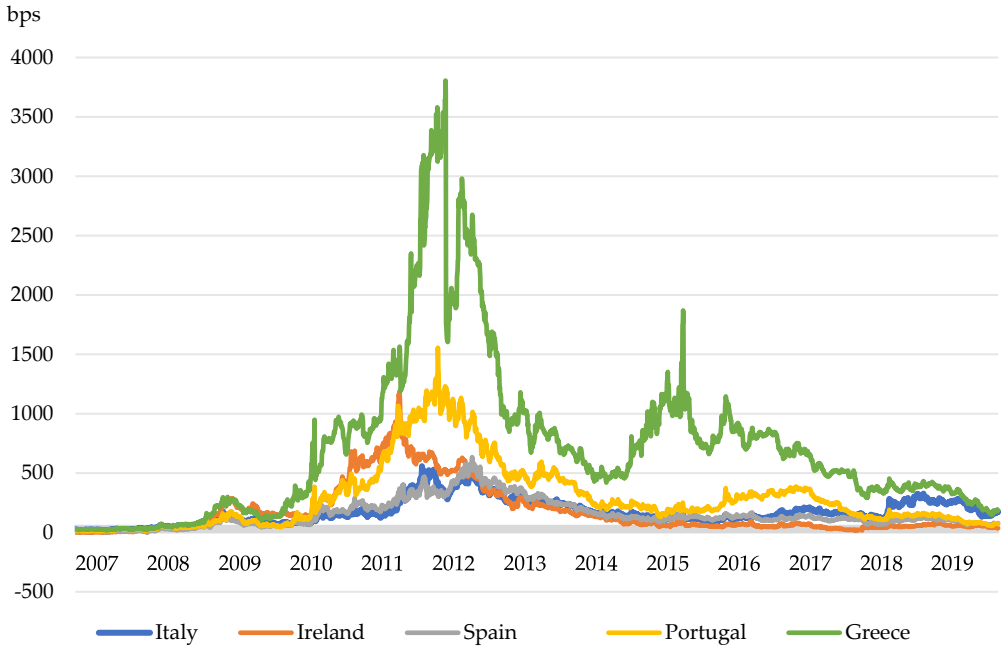
Developments in Target2 varied amongst EANCBs. In particular, Target2 liabilities for central banks of periphery countries like Italy, Spain, Greece and Portugal peaked at some point in 2012 – around the time of Draghi's 'whatever it takes speech'. Thereafter, in Italy, Spain and Portugal, T2 balances followed a downward trend up until 2015 before embarking on an upward path to a level exceeding that in 2012. Ireland's T2 liabilities reached an earlier peak towards the end of 2010 but declined consistently thereafter. Meanwhile, Germany registered a parallel rise in intra-Eurosystem claims because of the crisis of confidence that reduced the volume of credit transfers to foreign institutions in crisis-hit countries to a trickle while banks domiciled in Germany continued to attract substantial flows from abroad.

As noted earlier, evidence documented by authors such as De Grauwe and Ji (2012) and Steinkamp and Westermann (2012) points towards the relationship between T2 liabilities and developments in the sovereign bond market – particularly the association between high government bond yields and large T2 liabilities, and

between low government bond yields and large T2 claims in the recent sovereign debt crisis in Europe. As Target 2 accounts for the bulk of the difference between the ECB definition of Eurosystem and ESTA, it is intriguing to see whether these intra-Eurosystem flows tend to follow or lead spikes in the relevant interest rates on the bonds.

As the recent financial crisis unfolded and international investors became increasingly concerned with the sustainability of government debt, long-term government bond spreads relative to Germany have spiraled up for some Euro Area countries, such as Greece, Ireland, Italy, Portugal and Spain (Figure 4.16) despite the reforms undertaken both at the Eurozone and national levels. In particular, during the 2008-2012 period, their spread vis-à-vis Germany widened to unprecedented levels since the introduction of the Euro in 1999. Only at the end of 2012, the surge in the spread calmed down, approaching lower levels.

Figure 4.16 Evolution of the 10-year Sovereign Bond Spreads vis-a-vis Germany



Source: Thomson Reuters Datastream Database

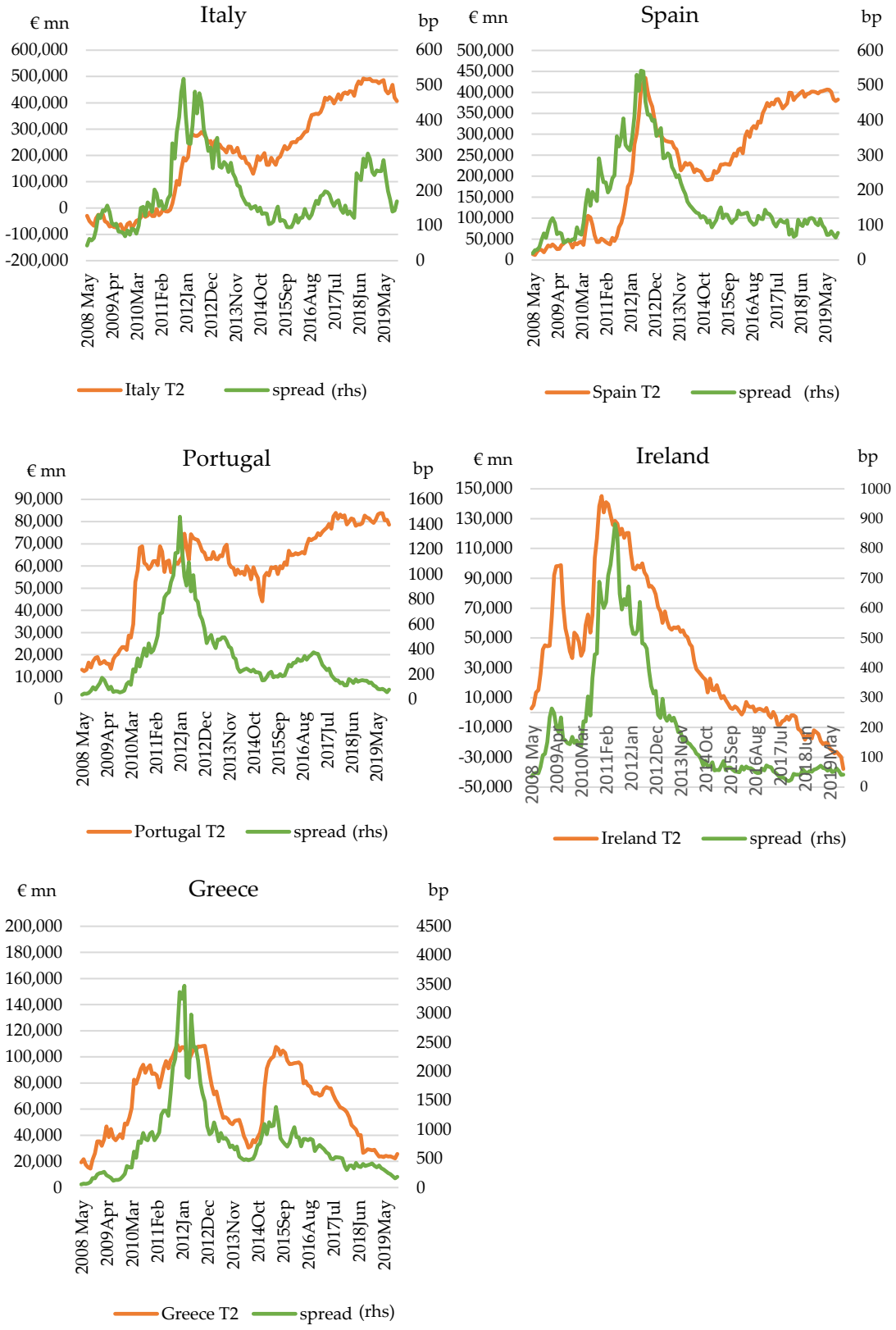
The surge of the sovereign spread of some Euro Area countries since 2008 has reflected both countries' fiscal positions and macroeconomic fundamentals, and more general factors such as liquidity risk, international risk aversion, negative market sentiments or contagion effects. The literature reports a number of different channels through which non-standard monetary policy measures may have affected government bond spreads[43].

As depicted in Figure 4.17, T2 and the yield spreads moved closely together during the first years of the crisis[44]. In fact, while Target2 heightened in 2011-2012 for the five hard-hit countries namely Greece, Italy, Ireland, Portugal and Spain (as described earlier), the respective yield spreads of these countries vis-à-vis Germany also reached a peak. In other words, the imbalances start to appear when the spreads between the two bonds widens, starting from June 2011. Indeed, various authors such as Merler and Pisani-Ferry (2012) and Cecchetti et al, (2012) noted that this pile up of T2 liabilities by these countries coincided with increasing bond yield spreads with the German bund and capital flight to core Eurozone countries.

As the spreads started to narrow for the GIIPS, T2 also began to decrease towards lower levels (Greece did not participate in the PSPP). In Ireland and Greece, T2 and the spreads moved closely together as the increase in T2 balances was reversed. Indeed, by 2019, T2 balances turned positive while the spreads were eliminated. In the case of Italy, Spain and Portugal despite that the spreads followed a similar downward path, T2 balances illustrate permanent effects as these have been growing again since March 2015, on account of the purchase of public debt of their respective treasuries in international markets under the PSPP leading to corresponding rising T2 imbalances[45].

[43] Contributors to this literature include Falagiarda and Reitz (2015).
[44] Steinkamp and Westermann (2012) found evidence of Granger causality in the causal relationship between lending defined as Target 2 liabilities and rescue packages and bond price changes.
[45] While this is considered as the official version about T2 imbalances, various authors such as Febrero E and Alvarez I (2019) argue that the NCBs purchased a large volume of public debt from residents, whose sale proceeds have then been transferred abroad, either to purchase international assets or to repay pending debt.

Figure 4.17 Target2 and Yield Spreads vis-à-vis Germany



In sum, EANCB purchases of claims on other EANCB, which are evident in ESTA but not in the ECB published accounts (Target 2 imbalances) are triggered by sufficiently alarming spikes in Greek and other sovereign debt spreads. However, in the case of Italy and Spain there is a disconnect between Target balances and the risk premium.

4.8 Expansions in ESTA, ECB Published Data and Monetary Loosening

Similar to the Bank of England, the task of the ECB is primarily to preserve price stability with an inflation rate below but close to 2 per cent. Subject to this condition, monetary policy must support balanced growth and full employment. The conventional monetary policy instrument to achieve the goal of price stability is the level of short-term interest rates (ECB, 2011). However, as the short-term policy rate reached near zero, this conventional means of effecting monetary ease was no longer feasible. As the normal monetary policy tool of lowering the short-term interest rate was constrained, the real interest rate, while negative, was still too high for the economy to quickly return to full employment and equilibrium, leading the economy to high unemployment. As Bernanke and Reinhart (2014) showed, one of the strategies to stimulate the economy involves increasing the size of the central bank's balance sheet beyond the level needed to set the short-term policy rate at zero. Indeed, the general macroeconomic situation and weak inflation dynamics in the Euro Area necessitated quantitative easing in the Euro Area.

Inflation in the Euro Area has been below the inflation target of the ECB for several years (except 2011 and 2012). Indeed, a prolonged decline in Euro Area inflation started in 2013, remaining close to zero three years later. The extent of this inflation shortfall has parallels with the size of the Eurosystem balance sheet expansion. As evident in Figure 4.18, as from 2014, the persistent gap between inflation and its target was accompanied by an expansion of the central bank balance sheet, ESTA, as defined in the thesis. This trend of low inflation and widening of the gap to the central bank target has prompted the ECB to resort to unconventional measures including the buying of assets, mainly sovereign bonds, to combat deflation, in turn expanding the

Eurosystem balance sheet. Indeed, the increasing risk that the ECB's inflation target continue to be missed and the much-needed boost to the economy called for the return to the anti-deflation asset-buying programme.

As inflation reached historically low levels in 2014, the Governing Council of the European Central Bank (ECB) decided to act boldly to counteract the risk of a too low inflation for a prolonged period and launched an expanded asset purchase programme. The asset purchase programmes, which aimed to address the medium-term risks to price stability, were extended to reach slightly below 30 per cent of total central bank assets by 2016 (refer to Chapter 6). Indeed, in January 2015, the ECB announced a massive expansion of its asset purchase programme to supplement the ECB's Asset-Backed Securities and Covered Bonds Purchase Progammes originally launched in September 2014. During a press conference in January 2015, Draghi declared that 'the adoption of further balance sheet measures has become warranted to achieve our price stability objective, given that the key ECB interest rates have reached their lower bound'. This confirms that the weak inflation dynamics at that time triggered the balance sheet expansions.

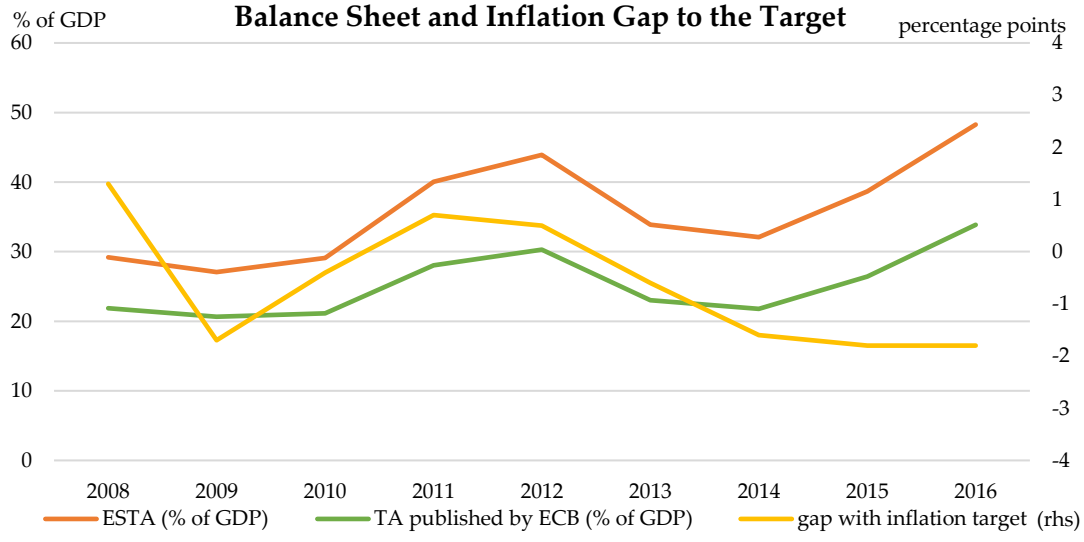
In sum, as the gap between inflation and the ECB target reached almost 2 percentage points in 2015 and 2016, the Eurosystem balance sheet registered the most significant expansions triggered by the loosening of monetary policy through the asset purchase programmes. It is also pertinent to note however, that while a relationship can be identified between the inflation gap and the Total Assets as published by the ECB (refer to Figure 4.18) reflecting QE, the rise in ESTA relative to the ECB definition of Total Assets is mainly driven by T2 balances which reflect individual countries rather than driven by the Euro Area as a whole as discussed in various Sections of this Chapter.

A deteriorated economic activity and the persistence of low inflation prompted expansions in the balance sheets of other central banks besides the Eurosystem, such as the Federal Reserve and the Bank of England. For example, as the unemployment

rate climbed to 8.7 per cent by March 2009, the Fed responded by announcing the buying of long-term Treasury securities and engaging in further purchases of government-sponsored enterprise debt and mortgage-backed securities, in turn expanding its balance sheet. Subsequently, as economic conditions continued to deteriorate, a second round of the Large-Scale Asset Purchases program was announced, intended to support the recovery and help ensure that inflation, over time, was at a level consistent with the Fed's mandate. As argued by Pasaogullari M. (2015), the Large-Scale Asset Purchase Programme was designed to support real economic activity and to offset disinflationary pressures, in turn triggering balance sheet expansions. The Bank of England has also injected money into the economy to boost nominal spending and inflation in order to meet the inflation target in the medium term.

To sum up, as growth was low and inflation dynamics were weak, the signs of demand weakness were overwhelmingly pointing to the need for stimulating monetary policies. It emerges clearly that this monetary loosening necessitated by a quickly worsening economic environment triggered, at least partly, the expansion of the Eurosystem balance sheet. Put differently, the balance sheet became a tool clearly aimed at boosting output and inflation. However, over the more recent period, the effectiveness of the ECB's monetary policy to address the weak inflation dynamics remain doubtful, as inflation remained weak, despite securing higher growth. This

Figure 4.18 Eurosystem Balance Sheet (ESTA), ECB Published Balance Sheet and Inflation Gap to the Target



poses a dilemma for the central bank attempting to phase out unconventional monetary policies and returning its balance sheet to normalization. In sum, ECB QE and the resultant expansions in the overall balance sheet are triggered by a combination of the zero lower bound and the perceived need for monetary loosening, as indicated by sub-target inflation forecasts and weak GDP.

4.9 Expansions in ESTA, ECB Published Data and Country-Specific Debt Crises

The Eurosystem balance sheet as published by the ECB nets out intra-transactions between EANCBs. As depicted in Figure 4.19 and Figure 4.20, a cursory look at the evolution of the Eurosystem Total Assets (ECB definition) and GDP growth indicates that macroeconomic developments exerted some influence on the evolution of the balance sheet (excluding the intra-transactions).

ESTA balance sheet expansions not included in the ECB balance sheets mainly reflect developments in Target2. This source of indirect funding appears to be related to a certain reluctance of European institutions in setting up a 'lender of last resort' mechanism in order to provide Member States in need with financial support.

From an empirical perspective, the literature has expressed various positions on the determinants of T2 balances. In particular, statistical analysis by Cecioni and Ferrero(2012) showed a correlation between T2 imbalances and balance-of-payments financial account imbalances. In contrast, the econometric analysis by De Grauwe and Ji (2012) highlighted the negative and significant impact of government bonds' yields on the T2 imbalances.

As shown in Figure 4.21 for Italy and Spain, T2 imbalances increased in two waves. The first of these took place as the magnitude of T2 imbalances grew sharply after the outbreak of the Eurozone sovereign debt crisis in 2010 which triggered capital flight from debtor countries - Italy, Spain and Portugal, to creditor countries - Germany, the

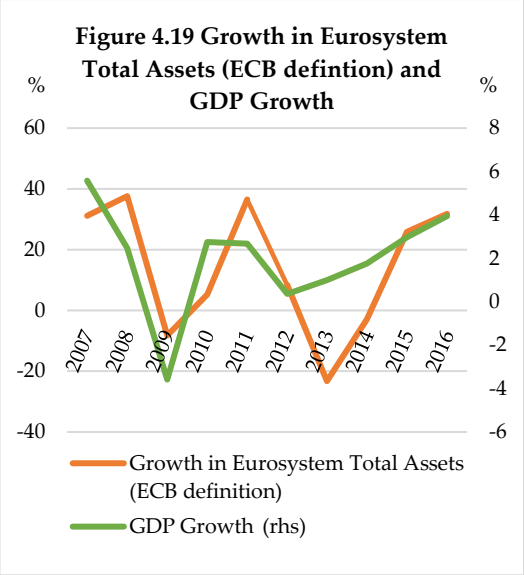


Figure 4.19 Growth in Eurosystem Total Assets (ECB defintion) and GDP Growth

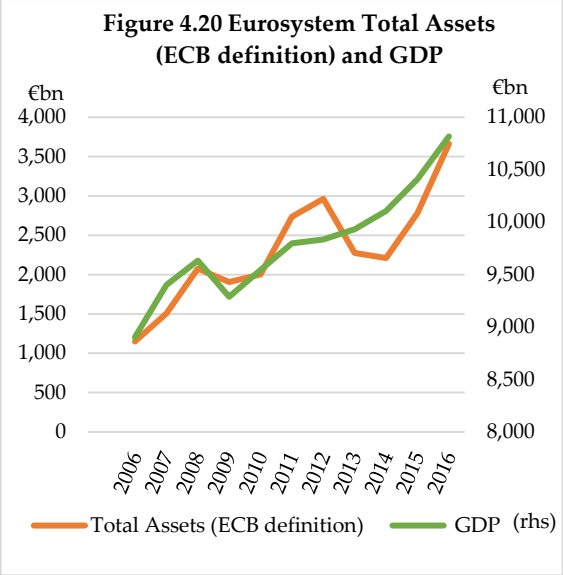


Figure 4.20 Eurosystem Total Assets (ECB definition) and GDP

Netherlands and Luxembourg. The second one has taken place from March 2015 onwards, with the same actors playing similar roles. This renewed surge in T2 balances since 2015 coincides with the beginning of the ECB's outright purchase of Euro Area government bonds under the Public Sector Purchase Programme (PSPP) in March 2015.

As noted earlier, in mid-2011, Italy and Spain began to pile up T2 liabilities, coinciding with increasing bond yield spreads with the German bund and capital flight to core Euro Area countries. Although the symptoms were rather similar, each country had its own problems. The troubles in Spain escalated as GDP and employment plummeted, and non-performing loans rose causing serious problems for banks. The implementation of expansive fiscal policies and the provision of financial assistance to banks helped the situation but led to a deficit of nearly 11 per cent of GDP in 2009, and a doubling of the public debt ratio. Conversely, the problem in Italy was a combination of an already high public debt coupled with a long decade of very low economic growth. The second Greek sovereign debt crisis, in 2011, which proved clearly that a sovereign state could default, was the ignition mechanism that unleashed a sudden stop and a capital reversal that was reflected in large T2 imbalances. The increase in T2 imbalances only came to a halt in mid-2012 following the ECB's announcements to purchase unlimited amounts of public debt from

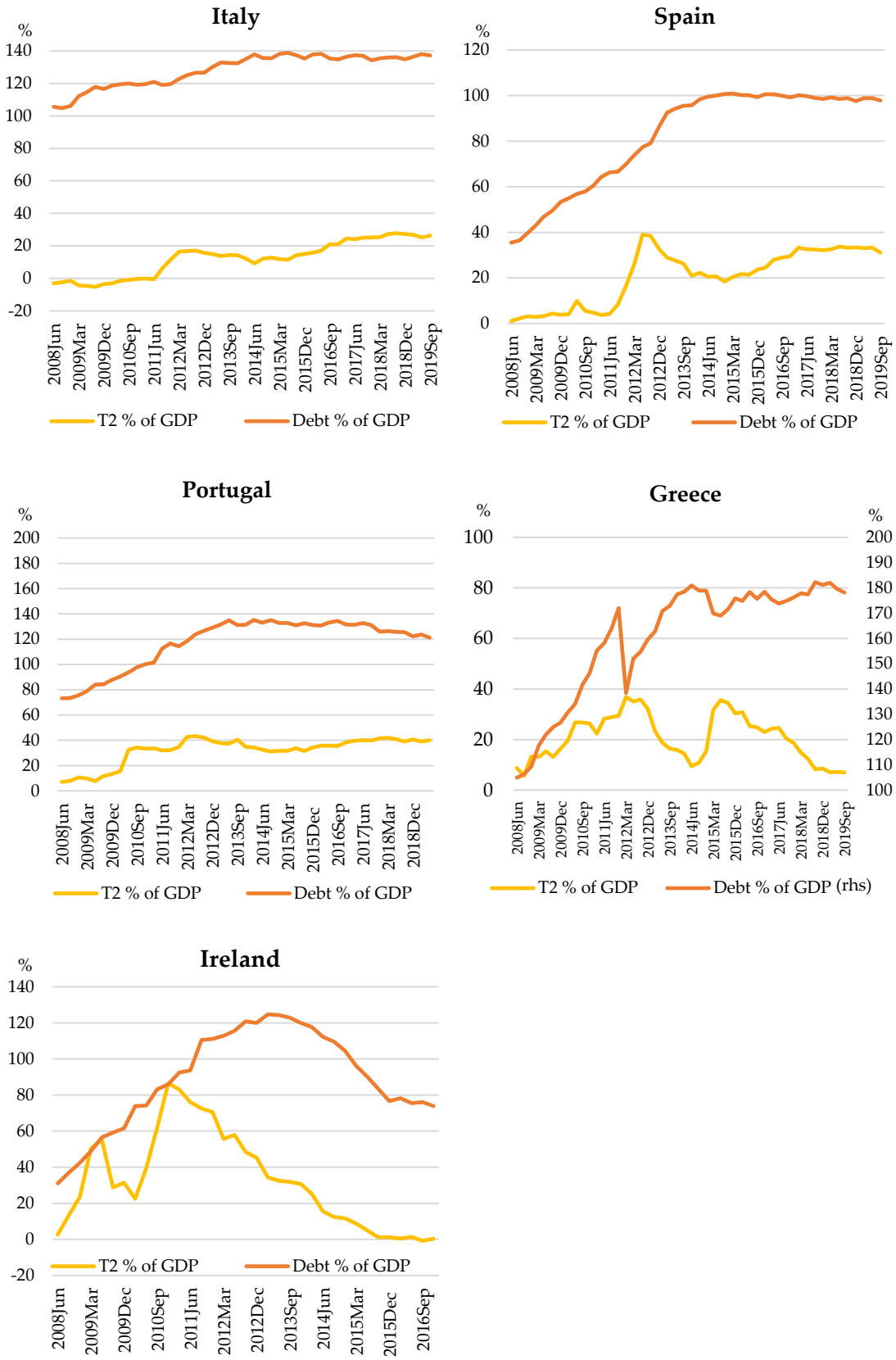
impaired economies through the Outright Monetary Transactions. This was also reflected in receding risk premium on the Eurozone financial markets. The financial assistance to the Spanish government by the European Stability Mechanism in mid-2012, to recapitalize some impaired banks, also contributed to the fall of T2 imbalances. Target2 imbalances started to grow again in March 2015 after the launch of the ECB's Quantitative Easing.

In sum, during the Euro Area crisis, T2 has been one of the key forms of lending. As the sovereign debt crisis heightened and public debt ratios increased particularly in Italy and Spain, borrowing from other central banks through Target2 imbalances became an indirect form of funding and a last resort.

In Greece and Ireland, the T2 liabilities accumulated rapidly in the months preceding the request for financial support to European institutions and the launch of the economic and financial adjustment programmes, in May and December of 2010, respectively. As a result of capital flight, the Target2 debt of the Bank of Greece had reached around €80 billion by May 2010. In May 2010, Greece began to receive tranches of official loans under the first bailout programme from the EU and the IMF, which arrested the rise of Greece's T2 debts. When the government of Greece receives a tranche of a loan (May, September, December 2010; March, July 2011), this capital inflow causes an equal reduction in the T2 liability of the Bank of Greece. The ECB's promise to purchase government debts in late 2012 set the T2 balances on a downward path as private funds returned, responding to reduced fears of sovereign defaults. From September 2014 to June 2015, T2 balances for Greece rose again as a result of capital outflows but followed a downward trend thereafter.

As illustrated in Figure 4.21, over the period as a whole, sustained increases in the debt of Italy and Portugal were almost entirely funded by T2, and largely so in Spain. There is, however, a distinct contrast with the case of Greece and Ireland. In the latter cases, while the rise in their debt was initially funded by T2, it was not at all over the long-run. Ireland and Greece present a contrast. In the case of Greece, T2 balances do

Figure 4.21: Target2 and General Government Debt



appear to have been driven by interest rate spikes (refer to Section 4.7), but movements in the debt to GDP ratio also reflected write-offs in 2012. In Ireland's case the rise in the debt to GDP ratio has been reversed to a significant extent, avoiding the need for T2 funding. But, overall, the massive accumulation of T2 imbalances and the resultant expansion in the Eurosystem balance sheet defined as ESTA appears to have been triggered by country-specific factors.

4.10 Are Euro Area National Central Banks on Auto-Pilot? The Predictive Power of the ECB's Capital in Determining their Loss Absorption Capacity

Section 4.4 above investigated the predictive power of the ECB's capital in determining the size of the balance sheets of the EANCBs and concluded that, particularly for relatively large EANCBs, the predictive power of the ECB's capital is strong. This implies that the EANCBs (with exception of the smaller EANCBs) operate on auto-pilot – branches of the "Mega-ECB". This Section again investigates the behaviour of EANCBs as branches of a greater entity by taking a different aspect and questions whether the ECB's capital is powerful enough to determine the financial strength of each EANCB. In other words, the following analysis determines whether the financial strength of the Eurosystem is distributed across the nineteen EANCBs in line with their share in the ECB's capital.

This Section looks at one particular aspect of the distribution of the financial strength of the Eurosystem across the nineteen EANCBs - the Conventional Loss Absorption Capacity (CLAC), defined by Buiter and Rahbari (2012b) as Capital and Reserves in addition to two other loss-absorbing items on the Eurosystem balance sheet – Revaluation Accounts and Provisions. These items accumulate when profits are transferred to reserves and in case of balances in the revaluation account arising from unrealised gains on assets and liabilities, including gold, foreign currency, securities and other assets. The actual capital and reserves, revaluation accounts and provisions are compared to those predicted by applying the ECB capital share of an EANCB to the Eurosystem CLAC. If the loss-absorption capacity of an EANCB is close to that

predicted by the share of the ECB capital, then it implies that the EANCB acts as if it is a branch of a greater entity in terms of its financial strength.

At the end of 2016, the CLAC of the Eurosystem amounted to €602 billion, almost tripling from €213 billion in 2006. Revaluation accounts, which consist of unrealized gains on the Eurosystem's holdings of gold, foreign exchange and other investments accounted for two-thirds of the CLAC. In June 2016, the ECB started publishing a breakdown of the distribution of the Eurosystem's capital and reserves and revaluation accounts but data prior to that date were only published by the individual EANCBs in their own Annual Reports. Data concerning provisions do not feature in the disaggregated financial statements published by the ECB but are only available through the EANCBs accounts. Following the treatment of CLAC by Buiter (2015), Appendix 4.4 presents data for the three measures of the CLAC over the 2006-2016 period:

(i) a narrow measure of CLAC consisting solely of Capital and Reserves
(ii) a relatively prudent measure of CLAC consisting of Capital and Reserves plus Provisions and
(iii) the most generous measure of the total CLAC being the sum of Capital and Reserves, the Revaluation Accounts and Provisions.

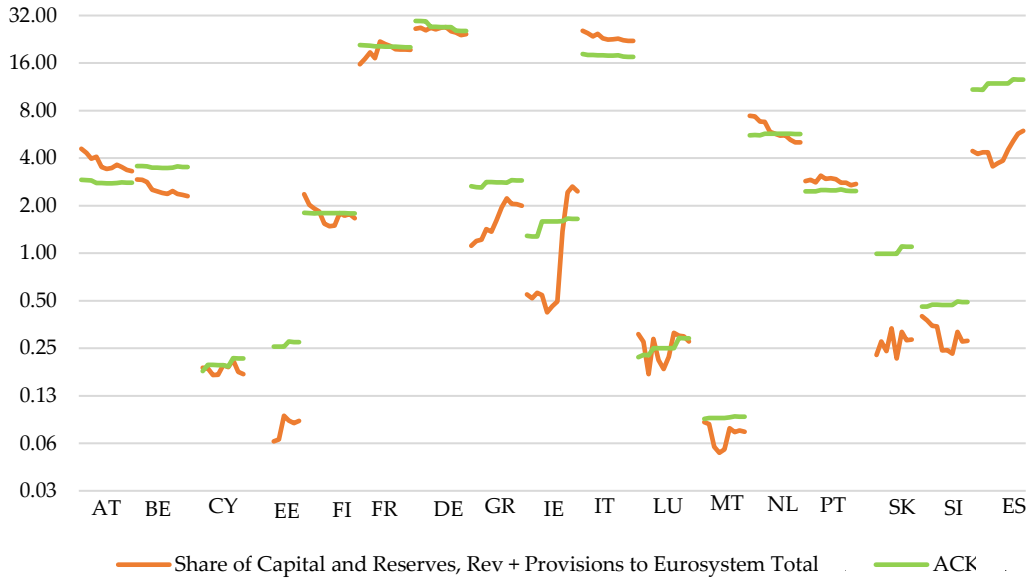
It is pertinent to acknowledge that, as noted in Buiter and Rahbari (2012a; 2012b) none of these three measures of the CLAC is likely to understate the true loss absorption capacity since they omit an important off-balance sheet asset of a central bank, namely the present discounted value of current and future seigniorage. As explained by Buiter (2015), for the EANCBs this off-balance sheet asset is defined as its capital key weighted share of the present discounted value of the future seigniorage of the consolidated Eurosystem. Given that the purpose of the investigation in this Section is to determine the extent to which the financial strength of each EANCB is ruled by its share in the ECB capital (the capital key), such omission is presumed to have no influence on the conclusions reached. Moreover, as the ECB's nominal interest rate

nears zero and seigniorage revenues become negligible, omitting the present discounted value of the current and future seigniorage becomes immaterial.

Starting from the most narrow measure of CLAC, if actual capital and reserves are compared with those predicted by applying the ECB capital share of an EANCB to the Eurosystem capital and reserves figure, the difference can be quite large (refer to Table 4.5). Looking at one point in time – 2016 – for the central banks of Germany, Greece, Portugal and Spain, the capital implied by multiplying the EANCB's capital share in the ECB by Eurosystem capital and reserves overestimates actual capital; by a factor of four and five in the case of Greece and Germany respectively and by a factor of seven in the case of Spain. In contrast, in the case of Austria, Belgium, Cyprus, Estonia, Finland, Italy, Slovenia and the Netherlands, the implied capital shares substantially underestimated the actual shares of these EANCB's capital and reserves in those of the Eurosystem. In the case of Ireland and France, the actual capital and reserve were almost twice as large as those implied by its capital share. In sum, it is observed that, based on this methodology, while some central banks are significantly overcapitalised (France, Ireland, and to a lesser extent Austria, Belgium, Cyprus, Finland, Italy, Slovenia and the Netherlands), others were highly undercapitalised (Germany, Greece, Portugal, Slovakia and Spain). This implies that the distribution of the ECB's capital is not strong in determining the financial strength of the EANCBs and, in this respect, they act more like separate entities. Over the period 2006-2016, the discrepancy between the actual and implied capital and reserves widened for half of the EANCBs, narrowing for four of the EANCBs and remaining relatively stable for six of the other EANCBs.

When the revaluation accounts are included, based on the 2016, for the largest five EANCBs (DE, FR, IT, ES, NL) the actual capital and reserves plus balances on revaluation accounts get closer to the amounts implied by their shares in the ECB's capital (refer to Table 4.6). Considering the most generous measure of CLAC, with the exception of the two late joiners of the Euro Area (LV, LT), all other EANCBs'

Figure 4.22 Shares of Capital and Reserves, Revaluation Accounts plus Provisions vs Adjusted Capital Key, 2006-2016



actual measure of CLAC moved even closer to that implied by the distribution of the ECB's capital (refer to Table 4.7). Indeed, except for Estonia, Slovakia, Slovenia and Spain, the ratios of actual to implied CLAC (including revaluation accounts and provisions) range between 0.7 and 1.5 (1 implying actual and implied figures are equal). It can thus be concluded that while some element of over and undercapitalization is evident amongst the EANCBs, to a large extent, the distribution of the ECB's capital influences the financial strength of the EANCBs when considering the broadest measure of CLAC. This is clearly evident in Figure 4.22 where the distance between the lines for each EANCB captures the divergence between the actual and implied capital and reserves, revaluation accounts and provisions. This conclusion is in line with that reached when assessing the power of the ECB's capital in determining the size of the EANCBs' balance sheets and is consistent with the hypothesis that the EANCBs are branches of a "Mega-ECB".

This conclusion, however, draws us to another paradox. As the amount of capital a central bank should have, depends amongst other factors, on the status of institutional relations with the government (Stella, 1997), it can be argued that both the Federal Reserve and the Bank of England do not, strictly speaking, need Loss Absorption Capacity since they are independent government agencies, that is, wholly

Table 4.5 Capital and Reserves
Ratio of Implied and Actual Capital and Reserves

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	0.39	0.43	0.50	0.43	0.61	0.61	0.63	0.64	0.67	0.69	0.69
Belgium	0.97	0.98	1.06	0.84	0.81	0.78	0.76	0.73	0.73	0.70	0.68
Cyprus			2.07	1.99	1.53	1.25	1.26	1.10	1.01	0.90	0.84
Estonia						0.69	0.68	0.65	0.69	0.69	0.67
Finland	0.63	0.64	0.69	0.57	0.75	0.73	0.73	0.71	0.72	0.74	0.74
France	1.04	0.95	0.72	1.09	0.54	0.57	0.59	0.59	0.59	0.58	0.59
Germany	3.30	3.60	4.21	3.50	4.93	4.99	5.14	5.26	5.17	5.34	4.89
Greece	2.22	2.06	2.35	2.25	3.14	3.18	3.27	3.35	3.58	3.70	3.77
Ireland	0.66	0.67	0.69	0.67	0.84	0.77	0.72	0.64	0.62	0.52	0.49
Italy	0.61	0.63	0.66	0.57	0.77	0.76	0.75	0.74	0.73	0.73	0.73
Latvia									0.85	0.93	0.94
Lithuania										1.47	1.46
Luxembourg	0.76	0.82	0.94	0.92	1.25	1.25	1.28	1.31	1.55	1.58	1.60
Malta			0.27	0.23	0.31	0.30	0.28	0.28	0.28	0.28	0.28
Netherlands	0.48	0.48	0.55	0.52	0.72	0.68	0.69	0.71	0.73	0.75	0.76
Portugal	1.25	1.30	1.43	1.22	1.65	1.81	2.06	1.97	1.96	2.05	2.12
Slovakia				1.79	2.52	2.55	2.63	2.70	3.10	3.20	3.26
Slovenia		0.35	0.44	0.42	0.53	0.52	0.53	0.53	0.57	0.58	0.58
Spain	4.05	3.31	3.87	3.84	5.55	5.61	5.78	6.09	6.69	6.90	7.04

Source: own computation

Table 4.6 Capital and Reserves plus Revaluation Accounts
Ratio of Implied and Actual Capital and Reserves plus Revaluation Accounts

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	0.71	0.79	0.83	0.8	0.91	0.93	0.91	0.91	0.95	1.02	1.00
Belgium	1.20	1.20	1.24	1.21	1.27	1.29	1.27	1.14	1.24	1.25	1.27
Cyprus			1.14	1.29	1.39	1.37	1.37	1.25	1.42	1.44	1.44
Estonia						3.54	3.46	2.34	2.80	2.90	3.01
Finland	1.36	1.46	1.27	1.38	1.71	1.72	1.82	1.61	1.61	1.52	1.61
France	1.13	1.05	0.97	1.06	0.84	0.86	0.87	0.86	0.88	0.87	0.87
Germany	1.03	1.02	1.07	0.94	0.99	0.98	0.99	1.04	1.02	1.04	1.02
Greece	3.58	3.13	3.16	2.94	2.92	2.81	2.79	3.16	3.25	3.35	3.19
Ireland	1.98	2.12	2.02	2.61	3.44	3.52	3.26	1.01	0.58	0.53	0.57
Italy	0.81	0.79	0.83	0.78	0.83	0.83	0.82	0.83	0.84	0.85	0.85
Latvia									3.64	4.00	4.43
Lithuania										4.33	4.51
Luxembourg	2.03	2.37	2.18	1.44	2.2	2.91	2.38	2.66	3.35	3.78	3.96
Malta			0.91	0.96	1.37	1.48	1.42	1.01	1.15	1.16	1.23
Netherlands	0.64	0.66	0.71	0.74	0.87	0.89	0.89	0.83	0.92	0.96	0.97
Portugal	1.09	1.00	1.01	0.91	0.93	0.91	0.91	1.01	0.99	1.06	1.01
Slovakia				4.31	4.65	4.29	3.18	3.77	5.44	6.24	6.14
Slovenia		1.17	1.33	1.50	2.01	2.3	2.36	1.81	2.15	2.20	2.33
Spain	2.85	3.55	3.43	3.76	4.48	4.13	4.11	3.91	3.33	2.94	2.96

Source: own computation

Table 4.7 Capital and Reserves, Revaluation Accounts plus Provisions
Ratio of Implied and Actual Capital and Reserves, Revaluation Accounts plus Provisions

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	0.63	0.67	0.73	0.68	0.79	0.81	0.80	0.77	0.80	0.83	0.84
Belgium	1.22	1.22	1.26	1.38	1.41	1.44	1.46	1.40	1.49	1.51	1.53
Cyprus			0.95	1.05	1.16	1.15	1.00	1.01	1.03	1.21	1.26
Estonia						3.98	3.86	2.74	3.17	3.26	3.15
Finland	0.76	0.89	0.93	0.98	1.17	1.21	1.20	1.00	1.04	1.01	1.07
France	1.33	1.21	1.11	1.19	0.93	0.96	0.99	1.04	1.04	1.03	1.04
Germany	1.12	1.10	1.14	1.01	1.04	1.01	1.00	1.06	1.03	1.06	1.05
Greece	2.38	2.18	2.14	1.98	2.06	1.74	1.44	1.26	1.41	1.41	1.45
Ireland	2.35	2.47	2.27	2.93	3.77	3.45	3.21	1.16	0.68	0.62	0.67
Italy	0.71	0.73	0.76	0.73	0.78	0.79	0.79	0.78	0.79	0.79	0.79
Latvia									4.36	4.81	5.32
Lithuania										4.81	4.66
Luxembourg	0.71	0.82	1.32	0.87	1.19	1.35	1.13	0.80	0.96	0.97	1.04
Malta			1.05	1.09	1.52	1.66	1.58	1.17	1.26	1.22	1.24
Netherlands	0.75	0.76	0.82	0.84	0.97	1.00	1.03	1.02	1.10	1.13	1.13
Portugal	0.86	0.84	0.88	0.81	0.85	0.84	0.85	0.91	0.89	0.92	0.90
Slovakia				4.95	5.17	4.79	3.14	3.50	4.08	4.08	4.31
Slovenia		1.32	1.46	1.54	1.96	2.25	2.05	1.55	1.83	1.86	1.96
Spain	2.45	2.55	2.49	2.74	3.36	3.19	3.08	2.63	2.46	2.20	2.11

Source: own computation

owned by a single sovereign government. As such, their liabilities are essentially guaranteed by their national governments. In contrast, arguably, as the "Mega-ECB" is effectively owned by the Euro Area national governments each for a proportionate share according to its EANCBs' ECB capital key, it becomes more complex to rely on national governments and therefore the "Mega-ECB" needs more Loss Absorption Capacity.

4.11 Are Euro Area National Central Banks on Auto-Pilot? The Predictive Power of the ECB's Capital in Determining the Distribution of the Non-Standard Measures

Having established a strong relationship between the share of the ECB's capital and the relative size of the balance sheet of each EANCBs, it is interesting to investigate whether a similar relationship exists concerning the distribution amongst the EANCBs of the purchase programmes launched by the ECB during the recent period of financial distress. This investigation is merited particularly as these purchase programmes, which are recorded under the balance sheet item 'Securities of Euro Area Residents', were the fastest growing item on the Eurosystem balance sheet – expanding by a factor of 25 by 2016.

In the course of the crisis, the European System of Central Banks (ESCB) has acted several times to support the financially distressed EU Member States and banking systems by purchasing debt instruments including sovereign and public sector bonds, covered bonds, asset backed securities and corporate sector bonds under a number of different purchase programmes. In 2009, the Governing Council of the ECB initiated the first Covered Bond Purchase Programme (CBPP1) - a programme to purchase covered bonds with the aim to promote the decline in money market term rates, to ease the funding conditions of banks and enterprises, to encourage credit institutions to maintain and expand their lending to clients, and to improve liquidity in the segment of the market. In November 2011, a second Covered Bond Purchase Programme (CBPP2) was initiated, followed by a third Covered Bond Purchase Programme (CBPP3) set up in October 2014. The objective of this later programme was the restoration of the transmission mechanism of monetary policy

and bringing the inflation rate closer to the intended target. In 2010, the EANCBs started purchasing securities in the context of the Securities Markets Programme (SMP) to address the severe tensions in certain market segments. In 2014, the Governing Council of the ECB decided to implement an Asset-Backed Securities Purchase Programme (ABSPP) while in 2015, the Governing Council adopted a decision on a secondary markets Public Sector Asset Purchase Programme (PSPP). This was complemented by the Decision of the European Central Bank of 1 June 2016 on the implementation of the Corporate Sector Purchase Programme (CSPP). As the SMP was terminated, a framework referred to as The Expanded Asset Purchase Programme (EAPP) (or Asset Purchase Programme – APP) grouped four elements: The Third Covered Bond Purchase Programme (CBPP3); The Asset-Backed Securities Purchase Programme (ABSPP); the Public Sector Purchase Programme (PSPP) and the Corporate Sector Purchase Programme (CSPP).

Figure 4.23 compares the share in the total holdings under the purchase programmes by each EANCB with their respective share in the ECB capital. It is clearly evident that for most of the EANCBs, their holdings of securities under the purchase programmes closely follow their Adjusted Capital Key. Only the relatively small EANCBs (EE, LU, MT, SI, SK) purchased a lower amount of securities than that dictated by their capital share, on account of lower purchases under the CBPP (refer to Figure 4.24). It is also interesting to note that in the case of Portugal, Greece and Ireland, in 2010 and 2011, they held a higher amount of securities then that implied by their capital share in terms of holdings under the SMP (Figure 4.24) but this discrepancy fell back over the following years. This is unsurprising since these EANCBs were three of the five issuers of securities under this programme and therefore were inclined to hold a relatively high level of securities issued within their jurisdiction. In the case of the PSPP, most EANCBs purchased an amount slightly lower than that implied by their capital share. On the other hand, France and Spain were the only two EANCBs whose level of securities held under the PSPP exceed that implied by the capital share.

Figure 4.23 Shares of Total Purchase Programmes vs Adjusted Capital Key 2010-2016

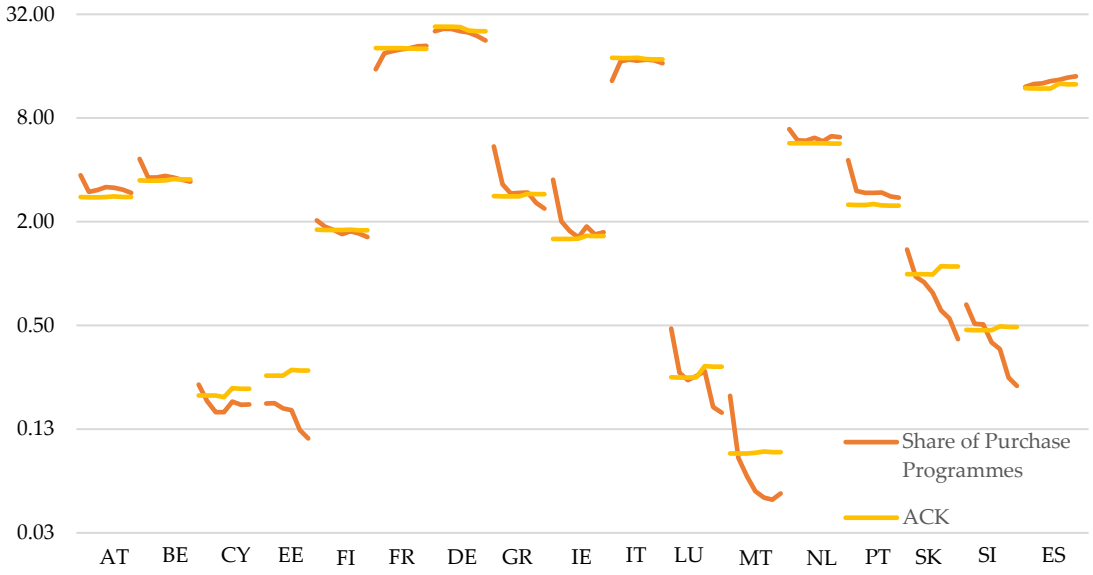
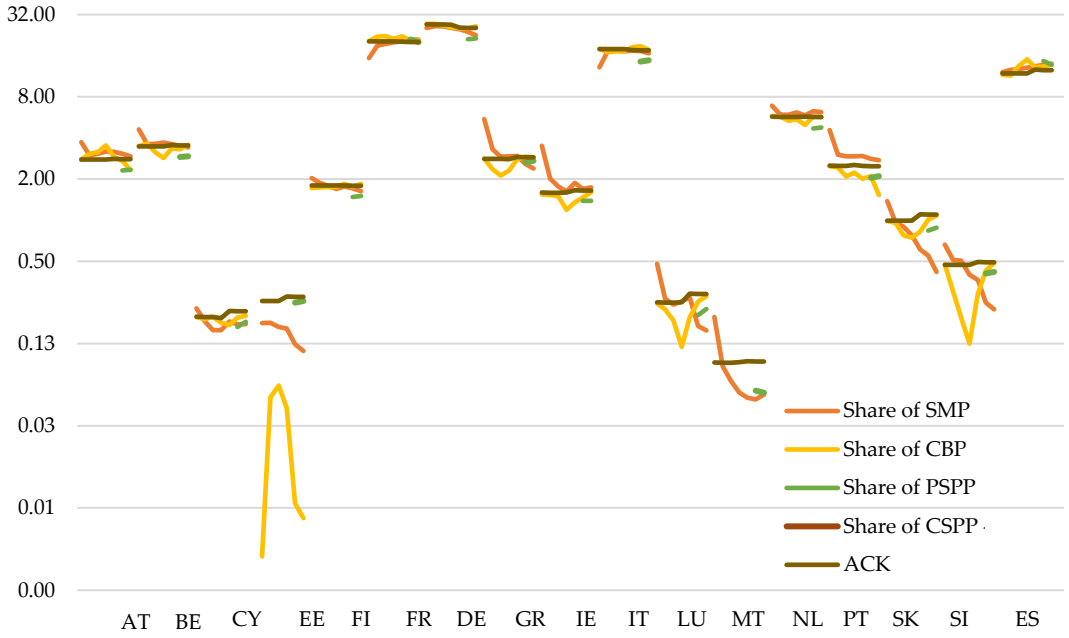


Figure 4.24 Shares of SMP, PSPP, CBPP and CSPP vs Adjusted Capital Key 2010-2016



For most of the EANCBs, their share of holdings of securities under the ECB's purchase programmes is close to their Adjusted Capital Key. Reconciling this conclusion with that reached earlier, one notes that as these asset purchases became increasingly large (constituting almost 30 per cent of total assets in 2016), the close relationship between the participation of each EANCB in these Programmes and their respective ACK contributed to the strong relationship between the share of ESTA and the ACK for each EANCB identified earlier. Indeed, this relationship between asset purchases and ACK was even stronger than that observed between the share of the remaining assets on the EANCBs' balance sheets (particularly the intra-Eurosystem claims) to ESTA and the ACK. In sum, as the EANCBs implemented the non-standard measures related to the ECB purchase programmes in line with their ACK, they reinforced their systematic behaviour of acting as branches of the "Mega-ECB".

4.12 The Federal Reserve Banks and the EANCBs: Do They also Operate on Auto-Pilot?

Different investigations carried out in earlier Sections of this Chapter point towards the premise that the EANCBs act as branches of a greater institution, with their balance sheet size, their financial strength, as well as their participation in the non-standard measures of the ECB, to a good approximation, following their share in the ECB capital. Put differently, there is evidence of striking predictive power of the ECB capital. In light of this, after contrasting the institutional framework of the Eurosystem with that of the Federal Reserve System, this Section investigates whether there is any evidence of similar systematic relationship with the balance sheets of the Federal Reserve Banks.

The institutional arrangements of the Eurosystem resemble those of the Federal Reserve System (FRS) in many ways. The ECB has, in principle, a role similar to that of the Federal Reserve's Board of Governors. A crucial difference, however, is that, while the various EANCBs play a role similar to that of the regional Federal Reserve Banks, unlike the ECB, the Federal Reserve's Board of Governors does not have its

own balance sheet. As described earlier, the ECB's shareholders are the NCBs of all EU member states, with each EANCB owning a share of the ECB's equity determined by the 'capital key'. In contrast, the Federal Reserve Banks each raise their capital through payments by banks that are members of the FRS[46]. Each member is required by law to become a shareholder and subscribe to shares of its district Reserve Bank in an amount equal to 6 per cent of its own capital and surplus[47]. Thus, the stakeholders of Federal Reserve Banks are privately owned banks (national banks and state-chartered banks). This contrasts with EANCBs who are owned by the governments of Euro Area member states. Moreover, while the share of the ECB capital owned by each EANCB depends on the population and the size of the economy (vis-à-vis the economy of the EA), the capital of the District Banks depends on the wealth of the member banks.

The analysis on the Federal Reserve System is carried out on the basis of the total assets of the Federal Reserve System - the twelve Federal Reserve Banks (FRB) – spanning over the 2006-2016 period (giving 132 observations). The total assets for the FRB are published by the Board of Governors of the Federal Reserve System in the H.4.1 statistical release, "Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks". The actual total assets for each District Bank are compared with the implied total assets calculated by distributing the total assets for the entire system amongst all the FRBs in line with their capital share. This is the same methodology adopted in the case of the Eurosystem in Section 4.4.

Due to the institutional differences between the Eurosystem and the Federal Reserve, (notably the fact that the ECB has its own balance sheet but the Federal Reserve Board of Governors does not), in the case of the Eurosystem the distribution of total assets

[46] Most commercial banks in the United States are not members of the Federal Reserve System, but the total value of all the banking assets of member banks is substantially larger than the total value of the banking assets of non-members.

[47] Of this amount, half must be paid to the Federal Reserve and half remains subject to call by the Board of Governors. When a member's capital or surplus changes, its holdings of Reserve Bank stock must be adjusted accordingly.

was compared with the distribution of the ECB capital amongst the EANCBs (rather than the capital which each EANCB holds on its balance sheet). In the case of the Federal Reserve, the distribution of total assets amongst FRBs is compared with the distribution of the total capital of the Federal Reserve System (the summation of the capital which each FRB holds on its balance sheet). Despite acknowledging this difference, it is noteworthy that while the ECB capital accounts for a very tiny amount of the total balance sheet of the Eurosystem (0.1 per cent of ESTA), the total capital held by the FRBs is also a very small fraction (0.7 per cent) of the total Federal Reserve System balance sheet.

Another point relevant to the analysis carried out in this Section is the fact that while in the case of the Eurosystem the analysis was based on ESTA – the gross total assets defined as total assets including intra-Eurosystem transactions – in the case of the Federal Reserve, there is no distinction between gross and net total assets in this regard. This reflects another institutional contrasting feature of the two systems which was briefly discussed in Chapter 2 - while Target2 provisions do not contain a settlement mechanism between individual central banks, the system of Interdistrict Settlement Accounts (ISA) allow for settling the transfer of book money for economic agents between different Fed districts in the U.S.

Except for the case of the Federal Reserve District Bank of Atlanta (with a share of 6% of total assets) and to a lesser extent that of San Francisco (with a share of 15% of total assets), there is a relatively weak relationship between shares of FRB to Fed Total Assets and their share in Federal Reserve System capital. This implies that the capital of the FRB, which depends on the size and the strength of the banking sector in that district, had relatively weak explanatory power vis-à-vis the distribution of the total assets of the entire Federal Reserve System over the crisis period.

The graphical presentations of the Actual Total Assets and Implied Total Assets presented in Figure 4.25 for the Eurosystem and in Figure 4.26 for the Federal Reserve

Figure 4.25 Implied vs Actual Assets Eurosystem

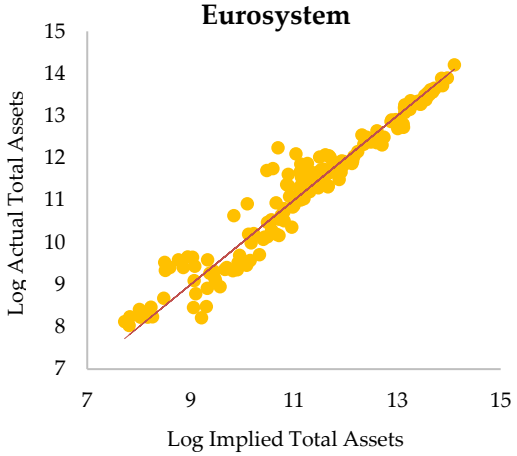
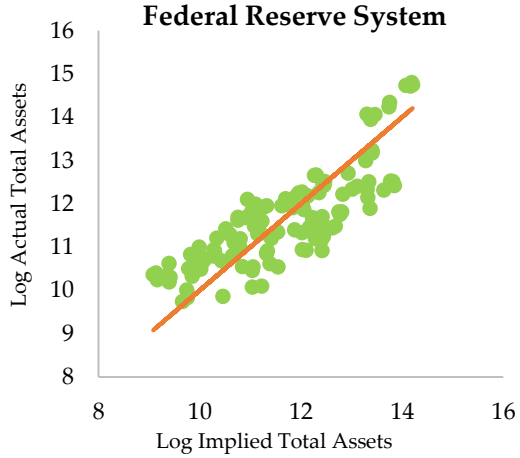


Figure 4.26 Implied vs Actual Assets Federal Reserve System

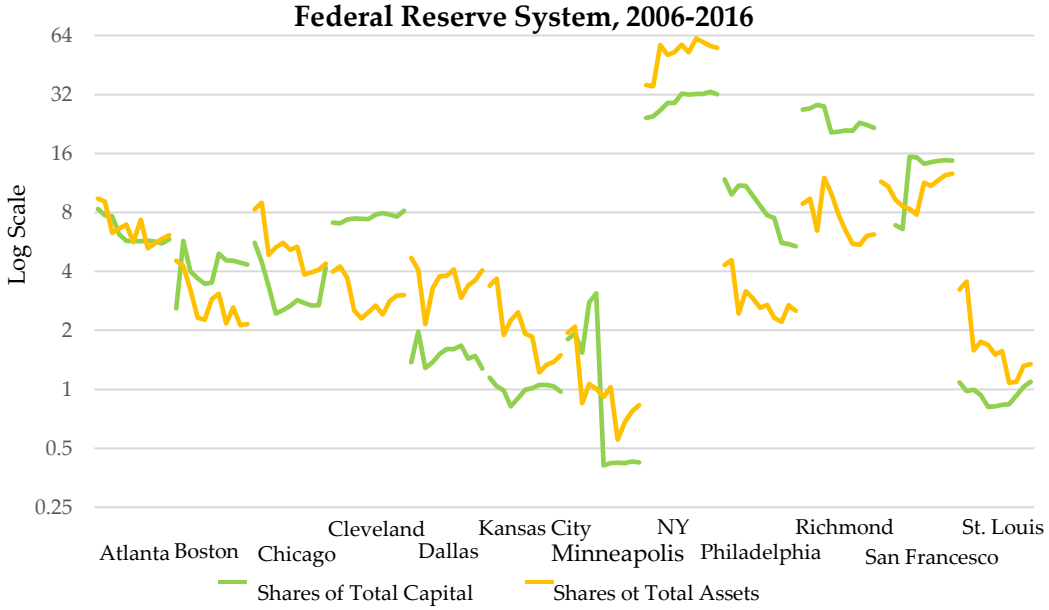


System indicate that there is a much stronger relationship in the case of the former. Over the 2006-2016 period, the EANCBs expanded their balance sheets more closely in line with shares in the paid-up equity in the ECB while a similar relationship is less evident in the case of the Federal Reserve Banks. This sharp contrast is also evident when comparing Figure 4.27 concerning the Federal Reserve Banks with Figure 4.6 above showing the EANCBs relationships.

In sum, there is a relatively weak relationship between the size of the Federal Reserve Banks' balance sheet and their contribution to the total capital of the Federal Reserve System. This supports the notion that the Federal Reserve System is not a unified institution, but an amalgamation of twelve regional Federal Reserve Banks (Koning, 2012). This is in stark contrast with the Eurosystem, whereby the stronger relationship between the size of the EANCBs' balance sheets and their share of paid-up capital of the ECB suggests that the EANCBs are branches of a unified institution (the "Mega-ECB").

While historically one gets the impression that there is less autonomy between the Federal Reserve Banks and the Federal Reserve System, this weaker relationship between the size of the Federal Reserve Banks' balance sheets and their share in total capital is striking. However, this result may be influenced by the institutional differences between the two systems outlined earlier which, to a certain extent, may not allow for a fully coherent comparison.

Figure 4.27 Shares of Total Assets vs Shares of Total Capital
Federal Reserve System, 2006-2016



In particular, in the case of the Eurosystem the distribution of total assets was compared with the distribution of the ECB capital amongst the EANCBs while in the case of the Federal Reserve (since the Federal Reserve Board of Governors does not have a balance sheet) it was compared with the capital which each FRB holds on its balance sheet. This methodology of conducting the comparison can be improved if one considers the capital that each EANCB holds on its balance sheet rather than its share of the ECB's capital. However, as discussed in Chapter 7, this is left for future research. Nevertheless, it is noteworthy that, one does not expect that this improvement in the methodology will make considerable difference in the results. This can be deduced by a quick look at Figure 4.22, which shows that, at least for most EANCBs, the share of capital they hold on their balance sheet is significantly in line with their share in the ECB capital. The comparison of the two systems presented here may have also been influenced by the institutional difference concerning the Target2 balances and the Interdistrict Settlement Account discussed earlier.

4.13 Concluding Remarks

Based on a new dataset presented earlier, an alternative balance sheet of the Eurosystem is assembled through a simple summation of the nineteen EANCBs' and

the ECB's balance sheets. This balance sheet for the Eurosystem is significantly larger than that published by the ECB. It is a balance sheet for a notional "Mega-ECB" – an institution that is larger than the Eurosystem – that considers intra-Eurosystem claims/liabilities of each EANCB as contributing to the asset/liabilities side of its balance sheet.

It was argued, firstly, that if evidence is found that the individual EANCBs operate on auto-pilot as branches of a greater institution (referred to as the "Mega-ECB" which is equivalent to the amalgamation of all the EANCBs and the ECB), then one is right to advocate the consolidation process which the ECB undertakes in coming up with the Eurosystem balance sheet. This, however, leaves one with an unresolved paradox as the greater institution, by definition, necessitates the EANCBs to be amalgamated rather than consolidated.

In light of this paradoxical issue, based on the dataset in Chapter 3, the goal of this Chapter was to investigate the relationship between the ECB and the EANCBs in order to determine any possible evidence of distinctive power by the ECB over the EANCBs. Being the main discrepancy between the balance sheet presented here and that published by the ECB, the intra-Eurosystem transactions were the subject matter dealt with in the second part of this Chapter.

It was shown, firstly, that a correlation exists between the share of total assets of each EANCB to ESTA (total assets for the "Mega-ECB") and their respective Adjusted Capital Key. Moreover, it was evident that in case of the relatively larger EANCBs, the correlation between their share of total assets and their Adjusted Capital Key is even stronger. On the other hand, for smaller EANCBs, some degree of autonomy was detected as the correlation between the share of total assets and their capital key is weaker. It was also shown that, over the period under investigation, in cases where total assets of an EANCB were below the level determined by the capital key, total assets increased over time.

This Chapter also investigated the relationship between the share of total assets of each EANCB and their respective Adjusted Capital Key when intra-Eurosystem transactions are consolidated – in line with the Eurosystem balance sheet published by the ECB. It is shown that for some of the larger EANCBs, when intra-ES claims are excluded from their balance sheet (in line with the ECB methodology) the correlation between their share of total assets and their Adjusted Capital Key is weaker than that observed when intra-ES transactions are not consolidated (as in this Chapter). It is shown that this weaker correlation reflects the fact that no correlation is observed between the share of each sub-component of intra-Eurosystem transactions for each EANCB and the respective ACK.

Other investigations were carried out which reinforce the premise that the EANCBs operate on auto-pilot. It was shown that the ECB has distinctive power over the EANCBs both in terms of their financial strength (defined as the loss absorption capacity) as well as regarding their participation in the purchase programmes launched by the ECB in response to the crisis. A comparison with the Federal Reserve System also supports these conclusions since the relationship between the share of total assets of each EANCBs and their respective ACK is stronger than that observed in the case of the FRBs.

Based on the dataset in Chapter 3, the investigations carried out in this Chapter draws a number of conclusions as summarized below. During the financial crisis, peripheral Euro Area countries were more hard-hit and needed to borrow, in turn weakening the sustainability of their debt and increasing their long-term government bond spreads. This surge of the sovereign spread which limited access to bond markets or reflected closing down of access to these markets, further accentuated the borrowing needs of these Euro Area countries. Faced with a lack of an overall official lender of last resort, these countries turned to Target2 borrowing via their NCBs, causing ESTA to rise relative to the Eurosystem balance sheet published by the ECB. This Target2 borrowing needed to be matched by Target2 lending.

Investigations in this Chapter have shown that this counterpart lending appears to have been carried out through an 'auto-pilot' mechanism – all the Euro Area countries had to take their share of "Mega-ECB" lending according to a rule which was identified here but never officially announced. In this way, the borrowing by those countries experiencing financial strain drove the lending by the other Euro Area countries. But, this lending was not directly driven by any bilateral process of lending. The rise in ESTA – the alternative measure of the Eurosystem balance sheet taking a 'gross' approach – is all that is required to explain the expansions in the EANCBs balance sheets. There is, therefore, evidence for systematic behaviour by the "Mega-ECB", operating not through the ECB's own direct actions, but by treating the EANCBs as branches that needed to satisfy the aggregate need for lending, generated by countries mostly hit by the crisis.

This also accentuates the case for taking up a 'gross' approach rather than looking at the net balance sheet. While the EANCBs acted on auto-pilot, as part of the "Mega-ECB", in their lending activities, this was not the case for their borrowings, which were clearly driven by the needs of their respective national governments. In a way, therefore, given the "auto-pilot" lending identified, the causal factor for the balance sheet expansion as published by the ECB was effectively the borrowing needs of these distressed governments. This remains obscured if only the consolidated balance sheet is considered, treating the "Mega-ECB" as if it were a monolithic institution in both lending and borrowing.

If one concludes that the "Mega-ECB" exits, then a follow-on question is: do EANCBs still really exist? According to investigations in this Chapter, as lending institutions the answer is negative – they simply do what the "Mega-ECB" dictates. But, as borrowing institutions, the answer is clearly in the affirmative – they borrow on behalf of their respective national governments. This is detected only if one adopts the 'gross' approach rather than consolidate the EANCBs balance sheets.

Chapter 5

The Size of the Eurosystem and its Components: A Dynamic Panel Data Analysis

The Eurosystem is composed of nineteen National Central Banks (EANCBs) and the European Central Bank (ECB). Each EANCB is a separate legal entity and publishes its own balance sheet. The ECB has also its own balance sheet. As discussed in the previous Chapter, consolidating the balance sheets of all the EANCBs gives a much higher balance sheet than that reported by the ECB since the latter nets off intra-Eurosystem balances. Indeed, at the end of 2016, ECB's total assets amounted to €5.2 trillion compared to the total Eurosystem assets as published by the ECB of €3.7 trillion.

The previous Chapter had already documented that the reported balance sheet of the Eurosystem is smaller than that defined as the aggregation of all EANCBs (and the ECB) and examined whether there is any link between the share ownership of the ECB by the EANCB and their respective balance sheet. This Chapter conducts an econometric analysis of the following key facts already documented in the previous Chapter namely:

- A correlation exists between the share of total assets of each EANCB to Eurosystem total assets (derived as the amalgamation of the EANCB's balance sheets) and their respective capital key[48].
- In cases where total assets of an EANCB are below the level determined by the capital key, total assets increased over time.
- When intra-Eurosystem claims are excluded from the EANCB's balance sheet (in line with the ECB's methodology), the correlation between their share of total assets and their Adjusted Capital Key is weaker than that observed when intra-Eurosystem transactions are not consolidated.

The contribution of this Chapter is therefore twofold. First, to my knowledge no investigation of the link between the EANCB and the ECB has taken place from a balance sheet perspective. This is the first study to estimate dynamic models that determine the rate at which EANCBs adjust their total assets towards the level that reflects their share in the ECB. Secondly, it provides insights into the behavior of EANCBs with respect to their balance sheet and to what degree this is implicitly controlled by the ECB.

A dynamic heterogeneous panel model using alternative pooled estimators is estimated using country-specific yearly data on central bank total assets from 2006 to 2016. The econometric results will be shown to be strongly supportive of the visual evidence previously discussed in Chapter 4, of the role of ESTA and, of the Adjusted Capital Key. It will also be seen that the relationship is weaker when intra-Eurosystem claims are consolidated (in line with the ECB methodology).

Caveats to this study remain. In particular, the dataset is short and limits the application of sophisticated econometrics. Moreover, the panel which covers the 19 Euro Area countries over the eleven-year period between 2006 and 2016 is an unbalanced one given that countries joined the Euro Area at different points in time.

[48] The formula by which each EANCB's notional share of the ECB's subscribed capital is determined: an equal weighting of the respective country's share in the total population and GDP of the EU.

Considering a balanced panel implies having even fewer observations. Moreover, data is marked by outliers particularly Luxembourg.

The rest of the Chapter is organized as follows. Section 5.1, describes the dataset and summarize its key features. Section 5.2 investigates the estimation framework, considering an Autoregressive Distributed Lag Model, an Error Correction Model and a Partial Adjustment Model as candidate dynamic model specifications. Section 5.3 presents the methodological framework that allows one to consider different degrees of heterogeneity, namely, the Mean Group Estimator, Pooled OLS estimator and the Fixed Effects estimator. Section 5.4 presents the empirical findings of a set of models followed by a discussion on the most appropriate dynamic model and degree of heterogeneity. Section 5.5 provides an econometric analysis of the relationship between the EANCBs' balance sheets net of intra-Eurosystem claims and their respective share of the ECB's capital. Finally, Section 5.6 draws conclusions from the analysis.

5.1 Data

As explained earlier, the aim of this Chapter is to investigate whether actual total assets of each EANCB are in any way influenced by the share of the ECB capital held by each respective EANCB. This investigation is based on a dataset of the balance sheets of all the nineteen individual EANCBs and the ECB, spanning over the 2006 to 2016 period presented in Chapter 3.

A quick look at a balance sheet of any EANCB as published in its Annual Report immediately reveals that one of its components on the asset side of the balance sheet is intra-Eurosystem balances[49]. This implies that a simple amalgamation of the balance sheets of the nineteen EANCBs gives a gross Eurosystem balance sheet that does not net off these intra-Eurosystem transactions. As a result, as noted by Whelan

[49] This item may feature on the liabilities side in case of some EANCBs.

(2012), the sum of all EANCB balance sheets is greater than the Eurosystem balance sheet as published by the ECB.

The econometric investigation is carried out on the basis of the actual total assets for each EANCB and a parallel estimate of total assets for each EANCB that completely reflects the fully paid-up capital share of the respective EANCB as explained in Chapter 4. In other words, this estimate of total assets for each EANCB was calculated by distributing the total Eurosystem assets (defined as the summation of all the EANCB balance sheets) amongst all the EANCBs in line with their capital share (refer to the formula on the next page). This resultant level of total assets for each EANCB is referred to as the 'Implied Total Assets' (ITA) and is produced in Table 5.1. The closer the actual total assets are to the 'Implied Total Assets' the stronger the link between the ECB and the EANCBs.

As described earlier, the level of Implied Total Assets indicates what would have been the level of total assets were one to assume that the size of the balance sheet of each EANCB fully reflects its capital share within the Eurosystem. For this reason, the capital share is key in determining the Implied Total Assets. As explained earlier in Chapter 3, the shares of fully paid-up capital are treated as the true capital shares of each EANCB in the ECB rather than the official 'Capital Key'. This is because the latter merely gives the notional share of the ECB's subscribed capital, which in particular cases, varies substantially from the share of fully paid-up capital.

As explained earlier, the Actual Total Assets (ATA) of each EANCB (Table 5.1 Column 5) as published in the financial statements of their respective Annual Reports sums up to ESTA. The Implied Total Assets (ITA) (Table 5.1 Column 6) reflect the distribution of ESTA among EANCB according to the capital share of the respective EANCB. The level of Actual Total Assets (ATA) and Implied Total Assets (ITA) therefore are defined as:

$$ESTA_t = \sum ATA_{it}$$

$$ITA_{it} = ACK_{it}\, ESTA_t.$$

Table 5.1 Summary Table of the Dataset as at the end of 2016

EANCB (1)		Year in which Member States joined the Euro Area[50] (2)	Shares of Actual Total Assets (3)	Adjusted Capital Key[51] (ACK) (4)	Actual Total Assets[52] (ATA) (5)	Implied Total Assets[53] (ITA) (6)
			Percentage Shares		€ billions	
Austria	AT	1999	2.53	2.79	132.3	145.6
Belgium	BE	1999	2.75	3.52	143.5	183.8
Cyprus	CY	2008	0.28	0.21	14.6	11.2
Estonia	EE	2011	0.15	0.27	7.7	14.3
Finland	FI	1999	1.64	1.78	85.7	93.2
France	FR	1999	17.54	20.14	915.7	1,051.7
Germany	DE	1999	28.39	25.57	1,482.2	1,334.9
Greece	GR	2001	2.92	2.89	152.5	150.8
Ireland	IE	1999	1.70	1.65	88.5	86.1
Italy	IT	1999	15.99	17.49	834.7	913.1
Luxembourg	LU	1999	3.87	0.29	201.9	15.1
Malta	MT	2008	0.11	0.09	5.9	4.8
Netherlands	NL	1999	5.94	5.69	310.2	297.0
Portugal	PT	1999	2.80	2.48	146.4	129.3
Slovakia	SK	2009	0.61	1.10	31.7	57.3
Slovenia	SI	2007	0.28	0.49	14.4	25.6
Lithuania	LT	2015	0.32	0.59	16.5	30.6
Latvia	LV	2014	0.31	0.40	16.2	20.9
Spain	ES	1999	11.89	12.56	620.8	655.8

Source: Annual Reports of the EANCBs and the ECB

Table 5.2 provides summary statistics for Actual and Implied Total Assets for the entire panel and a balanced panel. At the start of the period under analysis – 2006 – the Euro Area consisted of 12 countries. These are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. Subsequently, other Member States joined the Euro Area at different points in time.

At the end of the period under analysis – 2016 – together with the twelve countries, which were already in the Euro Area in 2006, the entire panel includes Cyprus,

[50] On 1st January 2002, Euro-denominated bank notes and coins were introduced as legal tender in the twelve countries participating in the Economic Monetary Union, but the original members' exchange rates were immutably locked in 1999.

[51] The adjusted capital share is computed as the shares of fully paid-up capital rebased to sum to 100 per cent.

[52] Total Assets as published in the financial statements of the respective Annual Reports of the EANCBs.

[53] ITA as compiled and presented in Chapter 4.

Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia who joined the Euro Area after 2006. Therefore, the entire panel is an unbalanced panel consisting of nineteen Euro Area Member States.

This study considers only the balanced panel, which, as detailed earlier, consists of the countries that joined the Euro Area prior to 2006. Since the other seven countries joined the Euro Area at a later point in time, they have a lot of missing data on total assets and therefore do not provide enough observations for a proper econometric analysis. Being an outlier[54], Luxembourg was also excluded from the balanced panel even though it formed part of the Euro Area in 2006. This implies that this analysis consists of a cross-section of eleven countries over an eleven-year period between 2006 and 2016.

In terms of both the Actual Total Assets (as published in the EANCB's Annual Reports) and the Implied Total Assets (computed to reflect the adjusted capital share), the entire and the balanced panels differ. Indeed, the means of both the actual and implied total assets in the entire panel were around 70 per cent of that in the balanced panel. This reflects the fact that countries who joined after 2006 and, are therefore excluded from the balanced panel, push down the mean of the entire panel since their

Table 5.2 Descriptive Statistics

	Cross Sections	Obs.	Mean	Std. Dev.	Min	Max
Entire Panel[55]						
Actual Total Assets (€bn)	19	179	198.1	259.5	3.1	1,482.2
Implied Total Assets (€bn)	19	179	198.1	280.2	2.3	1,334.9
Balanced Panel (2006-2016)[56]						
Actual Total Assets (€bn)	11	121	278.1	281.2	21.7	1,482.2
Implied Total Assets (€bn)	11	121	286.2	303.7	18.7	1,334.9

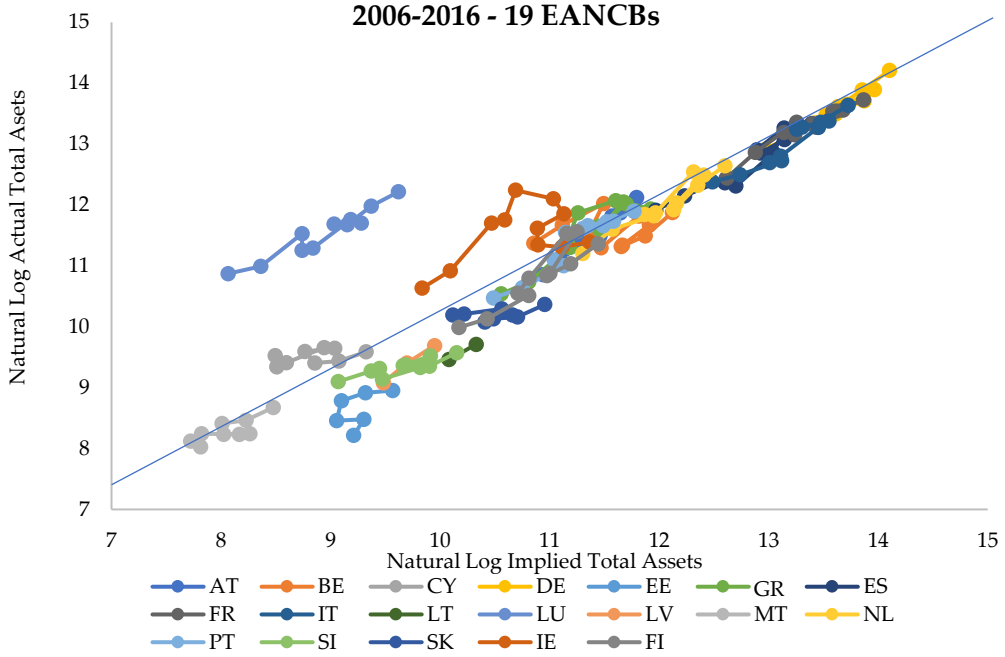
[54] Details about why Luxembourg is considered as an outlier are discussed below.
[55] Entire Panel: AT, BE, CY, EE, FI, FR, DE, GR, IE, IT, LU, MT, NL, PT, SK, SI, LT, LV, ES
[56] Balanced Panel: AT, BE, FI, FR, DE, GR, IE, IT, NL, PT, ES

balance sheet is relatively lean. One notes that, when the entire sample is considered, the mean for the Actual Total Assets is equal to that for the Implied Total Assets. This emerges from the fact that, as explained earlier, the Implied Total Assets are computed by imposing a different distribution of the same sum of Actual Total Assets amongst the Member States.

As shown in Table 5.2, the balanced panel, with a standard deviation of €281.2bn and €303.7bn for Actual and Implied Total Assets respectively, was more dispersed than the entire sample, with a standard deviation of €259.5bn and €280.2bn respectively. The distributions of Actual and Implied Total Assets are both highly skewed. Skewness is even more intense in the case of the entire panel with a minimum of €3.1bn (€2.3bn for Implied Total Assets) for Malta as compared to a minimum of €21.7bn for Finland (€18.7bn for Implied Total Assets for Ireland) in the case of the balanced panel. The maximum Actual Total Assets was €1,482bn (€1,335bn for Implied Total Assets) for Germany in both balanced and entire panels.

Figure 5.1 shows a distinct clear-cut bivariate relationship between Actual Total Assets and Implied Total Assets across the cross-section of 18 out of the 19 countries (with one outlier – Luxembourg- which is discussed further below). The striking thing about this chart is not just that the great majority of points lie close to a line with unit slope (implying a unit elasticity), it is that they lie extremely close to a line with unit slope *and* zero intercept: ie, Implied Total Assets predict the absolute *level* of actual assets, as well as their changes. This is striking because, given the definition of Implied Total Assets, the only source of cross-country variation allowed for in this relationship is the Adjusted Capital Key. The econometric results discussed below show that this is indeed the only source of statistically significant cross-country variation.

Figure 5.1 Actual vs Implied Total Assets
2006-2016 - 19 EANCBs



The only exception to this relationship is the high Actual Total Assets of Luxembourg, (which in 2016 even surpassed total assets of countries like Portugal, Greece, Belgium and Austria) which significantly exceeded the level implied by its mere share of ECB capital (0.3 per cent in 2016). In the early years of the crisis, huge Target2 balances, (accounting for 93 per cent of its total assets) contributed to Luxembourg's relatively high total assets, on account of private capital that had fled to Luxembourg as a safer market. More recently, one of the biggest increase of Target2 balances has, unsurprisingly, been recorded by Luxembourg (reaching about one-fifth of Germany's balances although its economy is about 200 times smaller), being home to subsidiaries of banks from outside the Euro Area and also being one of the countries with the largest international holders of Italian and Spanish bonds. Since it is an outlier, Luxembourg was excluded from the balanced panel used for the analysis here. In this regard, Appendix 5.1 shows that if Luxembourg was to be included in the panel of countries under analysis, there will be only a minimal impact on the results although the models will fit less well.

The upper panel in Figure 5.2 shows that for the majority of countries, the deviations between Actual and Implied Total Assets are minimal. The shares of Actual Total

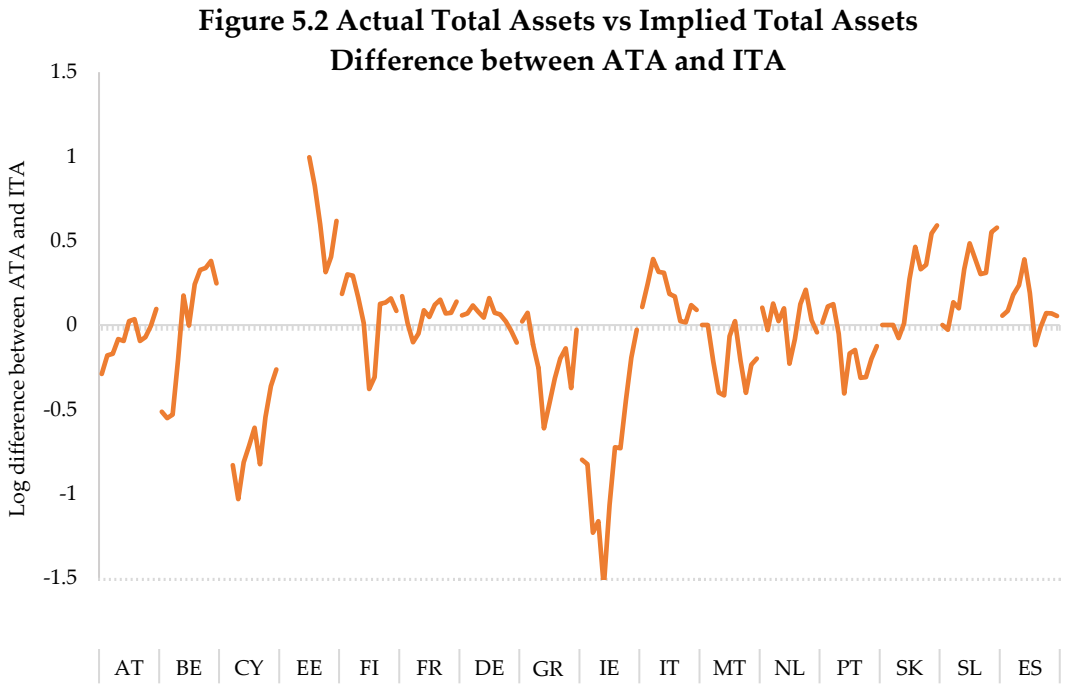
Assets are divergent from their respective capital share only in the case of countries like Cyprus, Greece and Ireland. Late joiners to the Euro Area such as Slovakia and Slovenia show some deviation from the Implied Total Assets. The two countries that together contribute for slightly less than half of the ECB capital – France and Germany – show almost no deviation at all between Actual and Implied Total Assets. This observation is econometrically confirmed in the following Sections. The upper panel of Figure 5.2 also shows how the deviations between Actual and Implied Total Assets varied overtime. The largest deviations are noticed in the three years between 2010 and 2012 but by 2016 Actual Total Assets seem to be closely moving in line with Implied Total Assets.

Looking at Figure 5.1, one may easily suspect that the relationship between Actual Total Assets and Implied Total Assets is spurious. However, in the lower panel in Figure 5.2, which illustrates the relationship between the Change in Log Actual Total Assets and the Change in Log Implied Total Assets[57], a strong correlation is clearly noted for most of the countries. Indeed, correlation is above 0.8 for countries like Austria, Belgium, France, Finland, Germany, Italy, Netherlands and Spain and between 0.7 and 0.8 for Luxembourg, Slovenia and Slovakia. Only Ireland, Portugal and Greece have a moderate correlation of between 0.6 and 0.7 while weak correlation is noticed only for Cyprus, Estonia and Malta.

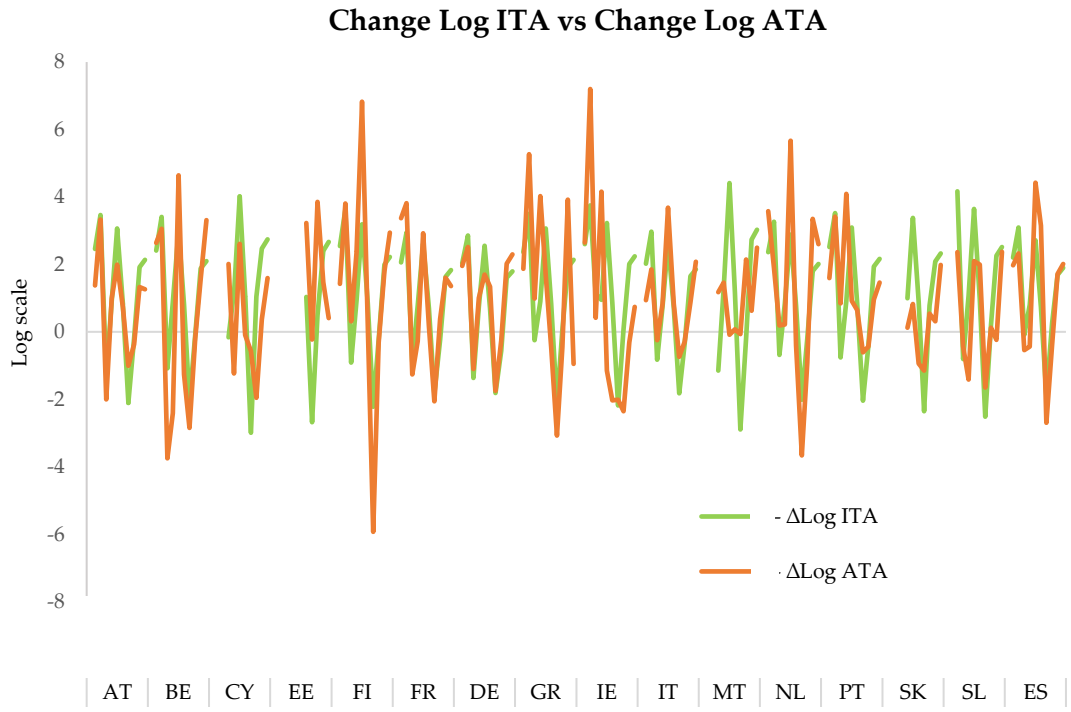
This close relationship between Actual and Implied Total Assets evident for most of the Euro Area countries, which is later also confirmed through econometric analysis, is weakened if the intra-Eurosystem transactions are consolidated in the balance sheet in line with the ECB methodology. This is discussed later in Section 5.5, which includes both a graphical and an econometric analysis and concludes that consolidating intra-Eurosystem transactions from the balance sheets of EANCBs conceal the strong relationship between the size of the balance sheet of each EANCB and its respective capital share which is otherwise revealed.

[57] $ITA_{it} = ACK_{it}\ ESTA_t$

Figure 5.2 Actual Total Assets vs Implied Total Assets



Each EANCB line consists of eleven data points representing each year between 2006 and 2016



5.2. Econometric Framework

The following Section investigates the estimation framework that is appropriate to capture the relationship between Actual Total Assets and Implied Total Assets. The simple dynamic model considered is:

$$a_{it} = \delta_{1_i}(L)b_{it} + u_{it} \ (1)$$

$$i = 1, 2, \ldots . . N, \quad t = 1, 2, \ldots . . T$$

where a_{it} is the logarithm of Actual Total Assets as published in the Annual Reports of the EANCB, b_{it} is the logarithm of Implied Total Assets for each EANCB (computed to reflect the respective share of the fully paid-up capital of each EA Member States) and L is the lag operator. It is assumed that both variables are $I(1)$ and cointegrate, making u_{it} an $I(0)$ process for all countries i.

The level of Implied Total Assets B_{it} (for each EANCB over the time-period under consideration) is defined as:

$$B_{it} = ACK_{it}\, TA_t \ (2)$$

where ACK_{it} is the Adjusted Capital Share for each EANCB over time and TA_t is the level of total assets for the Eurosystem (defined as the accumulation of the total assets of the 19 EANCBs and the ECB).

At this juncture, there are two dimensions to consider:

(i) the form of the dynamic equation and

(ii) the degree of homogeneity of coefficients.

The former, which involves the selection of model specification, is discussed here, while the latter is the subject matter of Section 5.3.

5.2.1 Error Correction Model

Considering a heterogeneous Autoregressive Distributed Lag (ARDL) form and assuming a parsimonious one-year lag structure[58], the unrestricted dynamic panel specification can be written as:

$$a_{it} = \mu_i + \delta_{1_i} b_{it} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} + u_{it} \quad (3)$$

It is stable (i.e. it will converge to its equilibrium) if $-1 < \delta_{3_i} < 1$, and then has a long-run solution:

$$a_{it}^{*} = \frac{\mu_i}{1 - \delta_{3_i}} + \frac{\delta_{1_i} + \delta_{2_i}}{1 - \delta_{3_i}} b_{it} = \alpha_i + \theta_i b_{it}$$

where a_t^* is the target or long-run equilibrium value for a_t to which it would tend in the absence of further shocks to b_t and u_t.

Equation (3) can be reparameterized in error correction form as:

$$a_{it} - a_{i,t-1} = \mu_i + \delta_{1_i}(b_{it} - b_{i,t-1}) + (\delta_{1_i} + \delta_{2_i}) b_{i,t-1} + (\delta_{3_i} - 1) a_{i,t-1} + u_{it} \quad (4)$$

$$\Delta a_{it} = \alpha_i + \beta_i \Delta b_{it} + \lambda_i \theta_i b_{i,t-1} - \lambda_i a_{i,t-1} + u_{it} \quad (5)[59]$$

where $\alpha_i = \mu_i$, $\lambda_i = 1 - \delta_{3_i}$, $\beta_i = \delta_{1_i}$, $\theta_i \lambda_i = (\delta_{1_i} + \delta_{2_i})$ and therefore $\theta_i = \frac{\delta_{1_i} + \delta_{2_i}}{\lambda_i}$.

Rearranging equation (5) gives:

$$\Delta a_{it} = \alpha_i + \beta_i \Delta b_{it} + \lambda_i (\theta_i b_{i,t-1} - a_{i,t-1}) + u_{it} \quad (6)$$

[58] A one-year lag structure is assumed since additional lags imply loss of observations from an already short panel – an 11-year panel. In addition, econometrics points towards a very short optimal lag order, if at all.

[59] In order to easily deduce equation (5), equation (4) may be written as:

$$a_{it} = \mu_i + \delta_{1_i} b_{it} - \delta_{1_i} b_{i,t-1} + \delta_{1_i} b_{i,t-1} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} - a_{i,t-1} + u_{it}.$$

There are a number of interesting restricted special cases. Firstly, a restricted case nested in a unit long-run coefficient model is considered:

$$\delta_{1_i} + \delta_{2_i} + \delta_{3_i} = 1$$

This restricted model can be written as:

$$\Delta a_{it} = \alpha_i + \beta_i \Delta b_{it} + \lambda_i \left(b_{i,t-1} - a_{i,t-1}\right) + u_{it} \ (7)$$

This is equivalent to imposing $(\delta_{1_i} + \delta_{2_i}) = \lambda_i$ in equation (4) or $\theta_i = 1$ in equation (6). For a long-run relationship to exist, the error correction coefficient $\lambda_i \neq 0$ is required. The closer λ_i is to 1 the closer the share of total assets approach the capital share[60].

Another version of the ECM presented in equation (7) is that which restricts both the short-run and long-run coefficients to equal 1 (indicating ATA proportional to ITA) as in equation (8) below:

$$\Delta a_{it} - \Delta b_{it} = \alpha_i + \lambda_i\left(b_{i,t-1} - a_{i,t-1}\right) + u_{it} \ (8)$$

If the intercept is also set to zero:

$$\Delta a_{it} - \Delta b_{it} = \lambda_i\left(b_{i,t-1} - a_{i,t-1}\right) + u_{it} \ (9)$$

Equation (9) implies that the long-run ratio of Actual Assets to Implied Assets equal to one.

In terms of adjustment to a long-run target:

$$\Delta a_{it} = \lambda_1 \Delta a^*_{it} + \lambda_2\left(a^*_{i,t-1} - a_{i,t-1}\right) + u_{it} \ (10)$$

[60] If $\lambda_i = \theta_i = 1$ and $\alpha_i = 0$ then $a_{it} = b_{it} + u_{it}$.

where the long-run target or equilibrium assets a_{it}^{*} are estimated with an equation incorporating EANCB's Implied Total Assets, b_{it} (as calculated above):

$$a_{it}^{*} = \alpha_i + \theta_i b_{it} \quad (11)$$

λ_1 and $\lambda_2$in equation (10) are adjustment coefficients which measure how Actual Total Assets, a_{it}, adjust to changes in the target and deviations from the target. This is a form of an Error Correction Model or Equilibrium Correction Model. The dependent variable changes in response to changes in the target and to the error - the deviation of the actual from the equilibrium in the previous period: $\left(a_{i,t-1}^{*} - a_{i,t-1}\right)$.

Employing an Error Correction Model (ECM) representation as in equation (6), (7), (8) and (9) above, offers the advantage that we can readily distinguish short-run from long-run behavior. Moreover, this model specification allows one to investigate the error correction term and deduce the speed of adjustment of the share of total assets to the long-run equilibrium defined by the capital share.

5.2.2 Partial Adjustment Model

An alternative parameterization, which nests the partial adjustment model, is also considered. The partial adjustment model provides one way of capturing the lagged adjustment of Actual to Implied Total Assets.

The Partial Adjustment Model is a special version of the ECM presented in equation (10) above where $\lambda = \lambda_1 = \lambda_2$.

$$\Delta a_{it} = \lambda_i\left(a_{it}^{*} - a_{i,t-1}\right) + u_{it} \quad (12)$$

The observed change in total assets Δa_{it} is a function of the gap between the target level of assets and (observed) total assets ($a_{it}^{*} - a_{i,t-1}$) in the previous period. This gap is closed at the speed of adjustment (SOA) λ which lies between zero and 1. The

magnitude of the SOA indicates how quickly EANCB's balance sheets move towards the target size. In addition, an error term, u_{it}, captures idiosyncratic shocks during the adjustment.

The Partial Adjustment Model is a special case of the Error Correction Model – it includes the same variables but it imposes the restriction that $\delta_2 = 0$.

Substituting equation (11) into equation (12) and restricting δ_2 to zero gives:

$$\Delta a_{it} = \alpha_i + \lambda_i(\theta_i b_{it} - a_{i,t-1}) + u_{it} \quad (13)$$

λ_i gives the proportion of the difference between the target level $\theta_i b_{it}$ (as in equation 11 above) and actual assets in the previous period – the speed of adjustment.

The estimation equation regressing the change in log assets on implied assets and lagged actual assets is written as:

$$\Delta a_{it} = \alpha_i + \lambda_i \theta_i b_{it} - \lambda_i a_{i,t-1} + u_{it} \quad (14)$$ [61]

Equation (14) is the most restrictive model. If $\theta_i = \lambda_i = 1$ and $\alpha_i = 0$ then, $a_{it} = b_{it} + u_{it}$.

The early development of this modelling of time series data is highly associated with Sargan-Hendry, two main protagonists of econometric modelling. The above models are estimated in Section 5.4 on the basis of the methodological framework discussed in the following section that allows to vary the degree of heterogeneity of the coefficients.

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[61] Taking equation (3) $a_{it} = \mu_i + \delta_{1_i} b_{it} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} + u_{it}$ and restricting δ_2 to zero gives:

$$a_{it} = \mu_i + \delta_{1_i} b_{it} + \delta_{3_i} a_{i,t-1} + u_{it}$$

Since $\alpha_i = \mu_i$ and $\lambda_i = 1 - \delta_{3_i}$ then $\delta_{3_i} = 1 - \lambda_i$:

$$a_{it} = \alpha_i + \delta_i b_{it} + (1 - \lambda) a_{i,t-1} + u_{it}$$

Allowing $\theta_i \lambda_i = \delta_1$ as above:

$$\Delta a_{it} = \alpha_i + \lambda_i \theta_i b_{it} - \lambda_i a_{i,t-1} + u_{it}.$$

5.3 Methodological Framework

In this Section, the most appropriate dynamic panel data methods to estimate the above equations are discussed. These different methods allow for the possibility of varying the degree of homogeneity imposed on the coefficients, which as noted earlier, is an important dimension in this study.

There are two procedures commonly used in analyzing panel data. At one extreme, one can estimate separate equations for each country and examine the distribution of the estimated coefficients across the countries. Of particular interest is the mean of the estimates, which Pesaran and Smith (1995) call the Mean Group (MG) estimator. At the other extreme is the approach that simply pools the data and ignores parameter heterogeneity, referred to as the Pooled OLS (POLS). Other intermediate estimators are the traditional pooled estimators such as the Fixed Effects (FE) estimator where the intercept is allowed to differ across countries (and across time-period in the case of the two-way fixed effects estimator) while all other coefficients and error variances are constrained to be the same. Another approach – the random effects estimator – assumes that both the intercept and the slopes of regressors are the same across countries while estimating the error variance specific to countries. In terms of heterogeneity, this approach lies between the fixed effects estimator and POLS. Given that, in this Chapter, the pooled OLS is chosen over the fixed effects estimator, there remains no scope in presenting the random effects estimator.

The main panel estimators considered in this analysis are the following:

- The Pesaran and Smith (1995) Mean Group Estimator (MG):
  This approach allows for heterogeneity in the slopes by estimating individually (OLS) the equation:

$$\text{ARDL: } a_{it} = \alpha_i + \delta_{1_i} b_{it} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} + u_{it}$$

(heterogeneity on eq. 3 above)

and define the estimator $\widehat{\delta_1}^{MG} = \frac{1}{N}\sum_{i=1}^{N}\widehat{\delta_1}$ with variance $V\left(\widehat{\delta_1}^{MG}\right) = \frac{1}{N(N-1)}\sum_{i=1}^{N}(\widehat{\delta_1} - \overline{\delta_1})^2$.

This approach is also applied to estimate the ECM equations 7, 8 and 9 above and the PAM equation 14 above.

This MG estimator produces consistent estimates of the average of the parameters, however, it does not take account of the fact that certain parameters may be the same across groups (Pesaran and Smith, 1995).

- One-Way Fixed Effects: In order to control for omitted variable bias, the one-way fixed effects estimator allows intercepts to differ across countries but constrains the slopes to be the same:

$$\text{ARDL: } a_{it} = \alpha_i + \delta_1 b_{it} + \delta_2 b_{i,t-1} + \delta_3 a_{i,t-1} + u_{it} \quad (15)$$

- Two-Way Fixed Effects: The two-way fixed effects estimator constrains slopes to be the same but allows intercepts to vary freely both over country and year.

$$\text{ARDL: } a_{it} = \alpha_{0i} + \alpha_{1t} + \delta_1 b_{it} + \delta_2 b_{i,t-1} + \delta_3 a_{i,t-1} + u_{it} \quad (16)$$

- Pooled OLS (POLS): The Pooled OLS approach allows all parameters to be homogeneous including the intercept and ignores parameter heterogeneity. The pooled OLS gives the within and between variation equal weight and uses least squares on:

$$a_{it} = \alpha + \delta_1 b_{it} + \delta_2 b_{i,t-1} + \delta_3 a_{i,t-1} + u_{it} \quad (17)$$

(imposing homogeneity on eq. 3 above)

$$\Delta a_{it} - \Delta b_{it} = \alpha + \lambda\left(b_{i,t-1} - a_{i,t-1}\right) + u_{it} \quad (18)$$

(imposing homogeneity on eq. 8 above)

$$\Delta a_{it} - \Delta b_{it} = \lambda\left(b_{i,t-1} - a_{i,t-1}\right) + u_{it} \quad (19)$$

(imposing homogeneity on eq. 9 above)

As in equation (9) above, $\lambda = 1$ in equation (19) implies that there is full-adjustment immediately.

At this juncture, two main potential biases of applying pooled estimation procedures to a dynamic heterogeneous panel model are pointed out. In the first case, particularly for small T, the estimates from the FE estimator will suffer from dynamic panel bias because of the correlation between the lagged dependent variable and the error term, by virtue of its correlation with the time-invariant component of the error term (Nickell, 1981). As a result, the FE estimator will be inconsistent and exhibits downward bias. The second problem of introducing dynamics into a panel data model is the potential bias induced by heterogeneity of the cross section units. As Pesaran and Smith (1995) pointed out, under slope heterogeneity, estimated coefficients are affected by a heterogeneity bias even for large N and T. In a model in which the coefficient on the lagged dependent variable is constrained to be equal across all cross-section units, there could be significant bias introduced if, in fact, the coefficients on the lagged dependent variable are not constant across the cross-section. This renders an upward bias, which is distinct from the fixed effects Nickell bias noted above. In our case of pooled estimators, the downward lagged dependent variable bias highlighted in the first case may, to some extent, offset the upward heterogeneity bias, but as Pesaran and Smith (1997) explain, in empirical applications it is difficult to judge the relative effects of the two biases in the sample.

5.4. The Estimated Models and Results

As noted earlier, this econometric analysis considers two dimensions: the form of dynamic equations to be estimated and the degree of homogeneity imposed on the coefficients. The first dimension was discussed in Section 5.2, which presented the econometric framework consisting of an unrestricted ARDL Model, ECM Models and

Models of PAM form. Subsequently, Section 5.3 considered the various dynamic panel data methods that may be employed in view of the second dimension concerning the homogeneity of the coefficients. This Section presents the estimation results[62] on the basis of the discussions so far.

This Section is organized as follows: Firstly, a description of the ten models estimated is presented. These models, which are of the ARDL, ECM or PAM form, are grouped according to the assumed degree of homogeneity of the coefficients and the corresponding dynamic panel estimation method employed. Secondly, the estimated coefficients for each model are presented. A discussion on the choice of the most appropriate model and its implications conclude this Section.

5.4.1 Description of the Estimated Models

Table 5.3 presents a description of the estimated Models. The first five models allow for heterogeneous coefficients. These Models are estimated by regressing separate equations for each country, allowing the possibility to derive the Mean Group Estimator suggested by Pesaran and Smith (1995). Model 6 allows for homogeneous slopes but heterogeneous intercepts while Model 7 also allows for time-effects, common shocks which effect all countries. The former is a One-Way Fixed Effects Model while the latter is a Two-Way Fixed Effects Model. Models 8, 9 and 10 restrict all parameters to be homogeneous including the intercept. More specifically, Model 9 imposes homogeneity on the ECM with short and long-run effects of unity while Model 10 also sets the intercept to zero. Since these three models impose homogeneous coefficients, they are estimated by the Pooled OLS approach.

[62] As mentioned in Section 5.1, this econometric analysis considers only the countries that joined the Euro Area prior to 2006 (excluding Luxembourg). This reflects the fact that very few observations are available for the rest of the countries that joined the Euro Area during the period under observation rendering their inclusion in the sample unfeasible.

Table 5.3 Description of the Estimated Models

Assumption 1: Heterogeneous Coefficients – Mean Group Estimator			
Model 1 (eq. 3)	ARDL	$a_{it} = \mu_i + \delta_{1_i} b_{it} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} + u_{it}$ Rewritten as: $\Delta a_{it} = \mu_i + \delta_{1_i} \Delta b_{it} + (\delta_{1_i} + \delta_{2_i}) b_{i,t-1} + (\delta_{3_i} - 1) a_{i,t-1} + u_{it}$	An unrestricted ARDL relating the log of a_{it} as a function of the log of b_{it}.
Model 2 (eq. 7)	ECM	$\Delta a_{it} = \alpha_i + \beta_i \Delta b_{it} + \lambda_i (b_{i,t-1} - a_{i,t-1}) + u_{it}$	Restricts the long-run coefficient to unity
Model 3 (eq. 8)	ECM	$\Delta a_{it} - \Delta b_{it} = \alpha_i + \lambda_i (b_{i,t-1} - a_{i,t-1}) + u_{it}$	Restricts both the long-run and short-run coefficients to unity
Model 4 (eq. 9)	ECM	$\Delta a_{it} - \Delta b_{it} = \lambda_i (b_{i,t-1} - a_{i,t-1}) + u_{it}$	Restricts LR and SR coefficients to unity and intercept to zero
Model 5 (eq. 14)	PAM	$\Delta a_{it} = \alpha_i + \lambda_i \theta_i b_{it} - \lambda_i a_{i,t-1} + u_{it}$	Restricts $\delta_2 = 0$
Assumption 2: Heterogeneous intercept and homogeneous slopes - Fixed Effects			
Model 6 (eq. 15)	ARDL	$a_{it} = \alpha_i + \delta_1 b_{it} + \delta_2 b_{i,t-1} + \delta_3 a_{i,t-1} + u_{it}$	One-way Fixed Effects
Model 7 (eq. 16)	ARDL	$a_{it} = \alpha_{0i} + \alpha_{1t} + \delta_1 b_{it} + \delta_2 b_{i,t-1} + \delta_3 a_{i,t-1} + u_{it}$	Two-way Fixed Effects
Assumption 3: Homogeneous Coefficients – Pooled OLS			
Model 8 (eq. 17)	ARDL	$a_{it} = \alpha + \delta_1 b_{it} + \delta_2 b_{i,t-1} + \delta_3 a_{i,t-1} + u_{it}$	Imposing homogeneity on eq. 3
Model 9 (eq. 18)	ECM	$\Delta a_{it} - \Delta b_{it} = \alpha + \lambda (b_{i,t-1} - a_{i,t-1}) + u_{it}$	Imposing homogeneity on eq. 8
Model 10 (eq. 19)	ECM	$\Delta a_{it} - \Delta b_{it} = \lambda (b_{i,t-1} - a_{i,t-1}) + u_{it}$	Imposing homogeneity on eq. 9

5.4.2 Estimation Results

5.4.2.1 Heterogeneous Coefficients – The Mean Group Estimator

The first five models allow for heterogeneous coefficients but impose different restrictions on the coefficients. In order to allow for different intercepts and slopes for each country, eleven country-specific regressions are estimated in case of each of the first five models. As explained earlier, the approach applied here is that put forward by Pesaran and Smith (1995) – the MG estimator – which produces an unweighted average of the coefficients: results for Models 1 to 5 are presented in Table 5.4.

Table 5.4 Mean Group Estimators for Model 1 to Model 5

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
$\hat{\alpha}$	0.6782	0.9038	-0.0105	0.0259	-0.0073	0.0188			0.7222	1.2709
$\widehat{\delta_1}$	0.9879**	0.1107	1.0373**	0.0948						
$\widehat{\delta_2}$	-0.5225**	0.1283								
$\widehat{\delta_3}$	0.4700**	0.1091								
$\widehat{\lambda\theta}$									0.7519**	0.1429
$\hat{\lambda}$			0.3671**	0.0795	0.4267**	0.0764	0.3231**	0.0680	0.8178**	0.0788
Goodness-of-fit statistics for dynamic models										
SER	0.1516		0.1611		0.1635		0.1609		0.1713	
$\bar{R}^2$	0.9735		0.6263		0.0461		0.0759		0.5776	
BIC	0.4338		0.2400		-0.0670		-0.4510		0.3626	
Akaike	-0.6463		-0.5701		-0.6071		-0.7211		-0.4475	

Asterisks indicate significance level on 2-tailed test: *=10%; **=5%

The Mean Group estimates for Model 1 show very rapid adjustment. In the ECM models, all three models show extremely rapid adjustment in differences, but with statistically significant adjustment to any divergence from equilibrium: Mean Group Estimates of the adjustment coefficient (and its standard error) are $\hat{\lambda}_{,MG} = 0.37$ (0.0795) in case of Model 2, $\hat{\lambda}_{,MG} = 0.43$ (0.0764) in case of Model 3 and $\hat{\lambda}_{,MG} = 0.32$ (0.0680) in case of Model 4.

Note that R-bar-squared values are not comparable across models, due to the different specifications of the dependent variable. But based on both Information Criteria, the most restricted model, Model 4 actually performs best.

Model 5 is a Partial Adjustment Model and restricts $\delta_2 = 0$. This differs from the previous Error Correction Models (Models 2, 3 and 4) since while the ECM imposes a long-run coefficient of one (and a short-run coefficient of one in case of Models 3 and 4), the PAM doesn't. The implied estimates of the speed of adjustment in the PAM are notably different from those reported in the ECM cases. Whereas, in case of the three ECM versions considered, the speed of adjustment ranges between 32 per cent and 43 per cent (based on the MG estimator), in the case of the PAM, the speed of adjustment is 82 per cent. However, this model clearly fits less well, and based on the Information Criteria, the ECM model with restrictions on the long-run and short-run coefficients (Model 4) clearly outperforms the PAM (Model 5).

The Mean Group Estimates in Table 5.4 summarise results by taking averages across individual countries. Tables 5.5 to 5.9 show results for the underlying heterogeneous coefficients in the different models. These results need to be interpreted with caution for two reasons. First, with just 11 time series observations, individual country equations have very low degrees of freedom, hence coefficients are typically poorly estimated, and hence many coefficients are not significantly different from zero at even notional significance levels. But, second, the underlying time series are most likely non-stationary, so that conventional tests of significance are not, in any case, likely to be valid.

Table 5.5 Country-Specific Estimates based on ARDL (1,1) Specification
Model 1: $a_{it} = \alpha_{o_i} + \delta_{1_i} b_{it} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\delta_1}$	$\widehat{\delta_2}$	$\widehat{\delta_3}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	4.6433** (1.5668)	0.6989** (0.0859)	0.2845 (0.3236)	-0.3829 (0.4110)	0.0432	0.9578
Belgium	3.3378 (3.5958)	1.3426** (0.3212)	-1.2170** (0.2795)	0.5756** (0.2376)	0.1483	0.6514
Finland	-2.3391 (2.7892)	1.5612** (0.3770)	-0.9371 (0.6261)	0.5833 (0.3540)	0.1951	0.8239
France	2.2857** (0.8854)	0.9987** (0.1092)	-0.5188* (0.2526)	0.3454 (0.2256)	0.0573	0.9475
Germany	-1.0137 (1.1696)	0.9469** (0.1299)	-0.8269* (0.4330)	0.9561* (0.4611)	0.0634	0.9557
Greece	1.5436 (3.6231)	0.8703 (0.4794)	-0.5801 (0.6822)	0.5836 (0.4995)	0.2246	0.7195
Ireland	5.7625* (2.8973)	0.3987 (0.6052)	-0.7427 (0.5598)	0.8203** (0.2453)	0.2792	0.5043
Italy	-2.6440** (1.0159)	0.8918** (0.1230)	-0.2820 (0.2014)	0.5865** (0.1738)	0.0638	0.9712
Netherlands	-1.3605 (1.7786)	1.4069** (0.2498)	-0.3774 (0.4546)	0.0778 (0.3562)	0.1288	0.8732
Portugal	-0.3163 (2.1996)	0.5312 (0.2902)	0.0061 (0.3848)	0.5037 (0.3259)	0.1299	0.8955
Spain	-2.4396 (1.6839)	1.2198** (0.3057)	-0.5559 (0.5494)	0.5210 (0.3620)	0.1325	0.8989

Figures in parenthesis are standard errors (SE) which are the output of estimating individual regressions for each country using Ordinary Least Squares.
Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

Table 5.6 Country-Specific Estimates based on ARDL (1,1) Specification
Model 2: $\Delta a_{it} = \alpha_{0_i} + \delta_{1_i} \Delta b_{it} + \lambda_i (b_{i,t-1} - a_{i,t-1}) + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\delta_1}$	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	0.0065 (0.0284)	0.8267** (0.1078)	0.2548 (0.2231)	0.0628	0.8690
Belgium	-0.1373** (0.0558)	1.5447** (0.2427)	0.2317 (0.1287)	0.1476	0.8145
Finland	-0.0655 (0.0722)	1.4496** (0.3428)	0.2709 (0.2980)	0.1904	0.7288
France	-0.0505 (0.0334)	1.1479** (0.1272)	0.6090* (0.3061)	0.0780	0.9074
Germany	0.0342 (0.0402)	0.8786** (0.1037)	-0.0636 (0.4389)	0.0625	0.9047
Greece	0.1381 (0.1179)	0.9776** (0.3671)	0.5535 (0.3311)	0.2105	0.4949
Ireland	-0.0391 (0.2775)	1.0392 (0.6160)	0.0504 (0.2834)	0.3343	0.0860
Italy	-0.0205 (0.0540)	0.7222** (0.1401)	0.3016 (0.2265)	0.0859	0.7417
Netherlands	-0.0586 (0.0482)	1.3167** (0.2100)	0.8585** (0.3338)	0.1244	0.8519
Portugal	0.1398** (0.0540)	0.4911** (0.2013)	0.4504* (0.2221)	0.1207	0.4527
Spain	-0.0620 (0.0619)	1.0165** (0.2882)	0.5210 (0.3856)	0.1416	0.7217

Figures in parenthesis are standard errors (SE) which are the output of estimating individual regressions for each country using Ordinary Least Squares.
Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

Table 5.7 Country-Specific Estimates based on ECM Specification

Model 3: $\Delta a_{it} - \Delta b_{it} = \alpha_{0i} + \lambda_i(b_{i,t-1} - a_{i,t-1}) + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	-0.0031 (0.0304)	0.3823 (0.2282)	0.0687	0.1671
Belgium	-0.0695 (0.0575)	0.1954 (0.1566)	0.1810	0.0583
Finland	-0.0193 (0.0658)	0.4302 (0.2841)	0.1987	0.1255
France	-0.0342 (0.0310)	0.6464* (0.3110)	0.0797	0.2695
Germany	0.0068 (0.0334)	0.1466 (0.4097)	0.0639	-0.1073
Greece	0.1346 (0.0963)	0.5516 (0.3084)	0.1970	0.1963
Ireland	-0.0346 (0.2509)	0.0487 (0.2640)	0.3128	-0.1202
Italy	-0.0584 (0.0590)	0.3201 (0.2646)	0.1004	0.0490
Netherlands	-0.0211 (0.0444)	0.9520** (0.3532)	0.1340	0.4104
Portugal	0.0796 (0.0627)	0.4878 (0.2867)	01562	0.1740
Spain	-0.0609 (0.0551)	0.5320 (0.3126)	0.1325	0.1741

Figures in parenthesis are standard errors (SE) which are the output of estimating individual regressions for each country using Ordinary Least Squares.
Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

Table 5.8 Country-Specific Estimates based on ARDL (1,1) Specification

Model 4: $\Delta a_{it} - \Delta b_{it} = \lambda_i(b_{i,t-1} - a_{i,t-1}) + u_{it}$

Country	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	0.3987** (0.1541)	0.0648	0.2586
Belgium	0.2129 (0.1599)	0.1856	0.0099
Finland	0.4056 (0.2573)	0.1884	0.2144
France	0.4463 (0.2557)	0.0807	0.2518
Germany	0.2126 (0.2342)	0.0604	0.0107
Greece	0.2230 (0.2097)	0.2071	0.1113
Ireland	0.0822 (0.0983)	0.2953	0.0019
Italy	0.0995 (0.1422)	0.1003	0.0513
Netherlands	0.9019** (0.3222)	0.1281	0.4612
Portugal	0.2637 (0.2332)	0.1614	0.1182
Spain	0.3077 (0.2405)	0.1341	0.1539

Figures in parenthesis are standard errors (SE) which are the output of estimating individual regressions for each country using Ordinary Least Squares.
Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

Table 5.9 Country-Specific Estimates based on ARDL (1,1) Specification Model 5: $\Delta a_{it} = \alpha_{1i} + \lambda_i \theta_i b_{it} - \lambda_i a_{i,t-1} + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\lambda\theta}$	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	3.4065** (0.6782)	0.7368** (0.0731)	1.0302** (0.0875)	0.0425	0.9399
Belgium	9.0151 (6.3273)	0.1546 (0.3201)	0.9315** (0.3911)	0.2800	0.3324
Finland	-4.2855 (2.6772)	1.2584** (0.3452)	0.8710** (0.1976)	0.2117	0.6647
France	2.3268* (1.0695)	0.9062** (0.1202)	1.0850** (0.1009)	0.0693	0.9270
Germany	-1.7319 (1.3001)	1.0258** (0.1445)	0.9016** (0.1224)	0.0744	0.8649
Greece	-0.1999 (2.9273)	0.8014 (0.4630)	0.7649** (0.2798)	0.2201	0.4479
Ireland	6.7856 (2.9406)	-0.2946 (0.3214)	0.3048 (0.2384)	0.2940	0.2933
Italy	-3.0496 (1.0383)	0.8460** (0.1265)	0.6215** (0.0962)	0.0681	0.8378
Netherlands	-1.7135 (1.6882)	1.3200** (0.2217)	1.1832** (0.1639)	0.1259	0.8485
Portugal	-0.2964 (1.6719)	0.5312* (0.2687)	0.4921** (0.1698)	0.1203	0.4566
Spain	-2.3130 (1.6821)	0.9851** (0.1994)	0.8105** (0.1542)	0.1327	0.7555

Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

This sub-Section has considered five models that allow of heterogeneous coefficients amongst countries. The next sub-Section focuses on two models that allow for some heterogeneous coefficients while some degree of homogeneity is imposed.

5.4.2.2 Heterogeneous Intercept and Homogeneous Slopes – Fixed Effects Model

The One-Way Fixed Effects Model defined in Model 6 assumes the same slopes and constant variance across countries but allows for differences in intercepts. This implies that since a country specific effect is time invariant and considered as part of the intercept, it is allowed to be correlated with other regressors. Another ARDL model is the two-way fixed effects model which constrains slopes to be the same but allows intercepts to vary freely both over country and year (Model 7). Both of these two models estimate the speed of adjustment around 28 per cent (refer to Table 5.10). However, Model 6 (country fixed effects), and Model 7 (both country and time fixed effects) are both individually and jointly insignificant from zero, and as shown in the

next Section, are outperformed in terms of both goodness-of-fit and model selection criteria by the same specification estimated with both sets of fixed effects excluded (Model 8).

Table 5.10 Fixed Effects Estimators: Model 6 and Model 7

	Model 6 One-way Fixed Effects		Model 7 Two-way Fixed Effects		
	Coeff.	S.E.	Coeff.	S.E.	
$\widehat{\delta_1}$	0.9982**	0.0941	0.5928	0.7084	
$\widehat{\delta_2}$	-0.7881**	0.1122	-1.2396	0.6518	
$\widehat{\delta_3}$	0.7212**	0.0757	0.7092**	0.0784	
$\widehat{\alpha_0}$			11.2769	5.1823	
			FE (cross)	FE (period)	
$\widehat{\alpha_0}$ – AT	0.7644	0.6086	-0.640289	2	-0.604245
$\widehat{\alpha_0}$ – BE	0.7255	0.6201	-0.488608	3	-0.279762
$\widehat{\alpha_0}$ – FI	0.7371	0.5844	-1.061439	4	-0.118407
$\widehat{\alpha_0}$ – FR	0.9004	0.7131	1.214992	5	-0.073845
$\widehat{\alpha_0}$ – DE	0.9318	0.7282	1.499544	6	0.098778
$\widehat{\alpha_0}$ – GR	0.8455	0.6089	-0.567607	7	0.252096
$\widehat{\alpha_0}$ – IE	0.9002	0.5823	-1.030180	8	0.195231
$\widehat{\alpha_0}$ – IT	0.8534	0.7058	1.050254	9	0.050737
$\widehat{\alpha_0}$ – NL	0.8294	0.6455	0.032982	10	0.144140
$\widehat{\alpha_0}$ – PT	0.8200	0.6024	-0.689632	11	0.335277
$\widehat{\alpha_0}$ – ES	0.8431	0.6844	0.679983		
Goodness-of-fit statistics for dynamic models					
SER	0.1620		0.1629		
$\bar{R}^2$	0.9698		0.9694		
BIC	-0.3403		-0.0434		
Akaike	-0.6840		-0.6081		

Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

5.4.2.3 Homogeneous Coefficients – Pooled Ordinary Least Squares

The third estimation technique considered is the Pooled Oordinary Least Squares (POLS) – a pooled linear regression that assumes a constant intercept and slopes across countries and time, which significantly increases degrees of freedom. Model 8 imposes homogeneity on the unrestricted model (Model 1); but is also a restricted version of Models 6 and 7, with fixed effects. Model 9 imposes homogeneity on the ECM version that restricts both the long-run and the short-run coefficients to unity while Model 10 is also homogeneous but more restrictive then Model 9 since it imposes the intercept to equal zero.

A key feature of pooled estimation is that all heterogeneity across the cross section is restricted to be driven solely by cross-country differences in the Capital Key, which in turn feeds into estimates of Implied Assets. Yet, as Table 5.11 shows, remarkably this restriction actually results in both improved goodness-of-fit and is preferred by model selection criteria.

Table 5.11 Pooled OLS Estimators: Model 8 to Model 10

	Model 8		Model 9		Model 10	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
$\widehat{\alpha_0}$	0.2142	0.2064	-0.0005	0.0157		
$\widehat{\delta_1}$	1.0489**	0.0818				
$\widehat{\delta_2}$	-0.8937**	0.0941				
$\widehat{\delta_3}$	0.8265**	0.0507				
$\hat{\lambda}$			0.1464**	0.0444	0.1467**	0.0431
Goodness-of-fit statistics for dynamic models						
SER	0.1604		0.1603		0.1596	
$\bar{R}^2$	0.9704		0.0831		0.0915	
BIC	-0.6885		-0.7564		-0.7991	
Akaike	-0.7867		-0.8055		-0.8237	

Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

As with the models summarized above in Table 5.4, it should be noted that the change in the dependent variable means that R-bar-squared values are not comparable between Model 8 and Models 9 and 10; however, equation standard errors (the standard deviation of sample prediction errors) are directly comparable both within the Table, and in comparisons with previous Tables. This comparison shows, first, that Model 8, which is a restricted version of Models 6 and 7, as shown in Table 5.10, actually fits somewhat better – implying that both time and country fixed effects are jointly insignificant; and, second, that comparing Models within Table 5.11, the simplest model, Model 10, is preferred. Thus, there is no evidence of any statistically significant variation in the behavior of different countries that is not explained by differences in their Adjusted Capital Keys.

While all Models in Table 5.11 imply that the relationship between log changes dominates short-run behavior, there is also clear evidence of some adjustment to deviations from the long-run relationship. In both Model 9 and Model 10, λ is statistically different from zero and different from 1 implying that the null hypothesis of $\lambda = 0$ and $\lambda = 1$ are both rejected. For Model 9 and Model 10 the speed of adjustment is 15 per cent (slightly lower than the 17 per cent for Model 8). Comparing these results with Table 5.4, the implied speed of adjustment in these homogeneous Models is slower than the average response of 32 per cent, as captured by the Mean Group Estimates for the equivalent heterogeneous Model (Model 4), reflecting very rapid estimated adjustment speeds of some individual countries shown in Table 5.8, which raise the mean response. However, as shown in the next Section, model selection criteria show that the more parsimonious pooled estimates in Table 5.11 are preferred.

5.4.3 Heterogeneity Testing and Model Selection

In order to select amongst the ten models presented in this Chapter, two model selection criteria are considered: the Akaike Information Criterion (AIC) and the Schwarz Bayesian Information Criterion (BIC). The latter penalizes the number of parameters more than the AIC.

Let MLL_j be the maximized log-likelihood of model j and k_j the total number of parameters estimated in model j. The AIC chooses the model with the lowest value of:

$$AIC_j = -2(MLL_j - k_j)$$

The BIC chooses the model with the lowest value of:

$$BIC_j = -2(MLL_j - 0.5k_j lnN)$$

where N is the number of observations.

The AIC prefers the unrestricted model if $2(MLL_{UR} - MLL_R) > k$. In other words, the null hypothesis is rejected if $AIC_u < AIC_R$. The BIC prefers the unrestricted model if $2(MLL_U - MLL_R) > kln(N)$.

As shown in Table 5.12, both criteria confirm that the most restricted homogeneous Model 10 is preferred. This implies that the preferred model has homogeneous coefficients, unit short and long-run coefficients on Implied Total Assets and partial adjustment to the long-run equilibrium.

It might be argued that b_{it} is endogenous and that this causes the coefficient estimates to be biased and inconsistent. However, in the preferred model – Model 10 – there is only one coefficient estimated, the speed of adjustment, so there is little scope for biased estimates.

Table 5.12 Summary of Results – Model Selection

	Akaike Information Criterion (AIC)	Schwarz Bayesian Information Criterion (BIC)
Assumption 1: Heterogeneous Coefficients		
Model 1	-0.6463	0.4338
Model 2	-0.5701	0.2400
Model 3	-0.6071	-0.0670
Model 4	-0.7211	-0.4510
Model 5	-0.4475	0.3626
Assumption 2: Heterogeneous intercept and homogeneous slopes		
Model 6	-0.6840	-0.3403
Model 7	-0.6081	-0.0434
Assumption 3: Homogeneous Coefficients		
Model 8	-0.7867	-0.6885
Model 9	-0.8055	-0.7564
Model 10	-0.8237	-0.7991

5.5 An Econometric Analysis of the Weaker Link: the Predictive Power of the ECB's Capital in Determining the Size of the EANCBs' Balance Sheets when intra-Eurosystem Transactions are Eliminated

As noted earlier, the individual balance sheets published by each EANCB do not consolidate the intra-Eurosystem transactions. In fact, this was identified as the main reason why the Eurosystem balance sheet published by the ECB differ from that estimated as an amalgamation of the balance sheets of all EANCBs (Chapter 4). It was also shown above that, overall, actual total assets closely model the level implied if each EANCB had to follow its share in the ECB capital and, if any deviations exist, these generally diminish over time. It is now interesting to see whether this strong result also holds if intra-Eurosystem transactions are consolidated in line with the definition pursued by the ECB in its publication of the Eurosystem balance sheet. For this purpose, this Section presents an econometric analysis of the relationship between the Adjusted Capital Key and Actual Total Assets for each EANCB less the respective intra-Eurosystem claims – in other words treating each EANCB balance sheet such that their summation is equal to the Eurosystem balance sheet published

by the ECB rather than the augmented Eurosystem balance sheet used in this Chapter so far. Thus, the Actual Total Assets (ATA^{net}) of each EANCB (Table 5.13 Column 3) sums up to the Total Assets for the Eurosystem as published by the ECB and can therefore be expressed as:

$$TA_t^{net} = \sum ATA_{it}^{net}.$$

Moreover, as explained earlier,

$$ATA_{it}^{net} = ATA_{it} - IntraES\ balances.$$

The Implied Total Assets net of intra-Eurosystem claims (ITA^{net}) for each EANCB (Table 5.13 Column 4) reflect the distribution of ECB published Total Assets according to the capital share of the respective EANCB and are defined as:

$$ITA_{it}^{net} = ACK_{it} TA_t^{net}.$$

As noted earlier and illustrated in Figure 5.1 and Figure 5.3, Luxembourg is a far outlier with distinct characteristics. For this reason, Luxembourg is included in the graphical analysis throughout almost all of the thesis[63] but excluded from both the econometric analysis in Section 5.4 as well as that in Section 5.5. In this regard, Appendix 5.1, which presents the econometric results if Luxembourg was to be included in the panel of countries under analysis, shows that similar results are obtained but the models fit less well.

[63] Luxembourg does not feature in two Figures in Chapter 6 because it stands as a far outlier.

Table 5.13 Summary Table of the Dataset: Consolidating Intra-Eurosystem Claims as at the end of 2016

EANCB		Actual Total Assets (1)	Intra-Eurosystem Claims (2)	Actual Total Assets net of intra-ES Claims (3)	Implied Total Assets net of intra-ES Claims[64] (4)
		€ billions			
Austria	AT	132.3	32.8	99.5	102.1
Belgium	BE	143.5	14.6	128.9	128.9
Cyprus	CY	14.6	7.3	7.3	7.9
Estonia	EE	7.7	3.0	4.7	10.0
Finland	FI	85.7	28.2	57.5	65.4
France	FR	915.7	117.0	798.7	737.6
Germany	DE	1,482.2	790.0	692.3	936.3
Greece	EE	152.5	4.5	148.0	105.8
Ireland	IE	88.5	2.4	86.2	60.4
Italy	IT	834.7	59.5	775.2	640.4
Luxembourg	LU	201.9	187.6	14.3	10.6
Malta	MT	5.9	1.2	4.7	3.4
Netherlands	NL	310.2	141.9	168.3	208.3
Portugal	PT	146.4	41.2	105.2	90.7
Slovakia	SK	31.7	2.2	29.5	40.2
Slovenia	SI	14.4	1.4	13.0	18.0
Lithuania	LT	16.5	4.6	11.9	21.5
Latvia	LV	16.2	4.6	11.6	14.7
Spain	ES	620.8	115.7	505.1	459.9

Source: Annual Reports of the EANCBs and the ECB and own calculations

Table 5.13 presents an extract from the dataset used in the analysis conducted in this Section. In particular, this Table shows total assets for each EANCB (as in Table 5.1), intra-Eurosystem claims, total assets for each EANCB net of intra-ES claims and the Implied Total Assets net of intra-ES claims as at the end of 2016. The significance of the intra-Eurosystem claims (exceeding two-fifths of consolidated total assets) is particularly immediately evident from Table 5.13.

[64] ITA net of intra-ES claims (ITA^{net}) are defined as the Total Assets for the Eurosystem as published by the ECB (TA^{net}) distributed among the EANCBs according to their respective ACK ($ITA_{it}^{net} = ACK_{it}TA_{t}^{net}$).

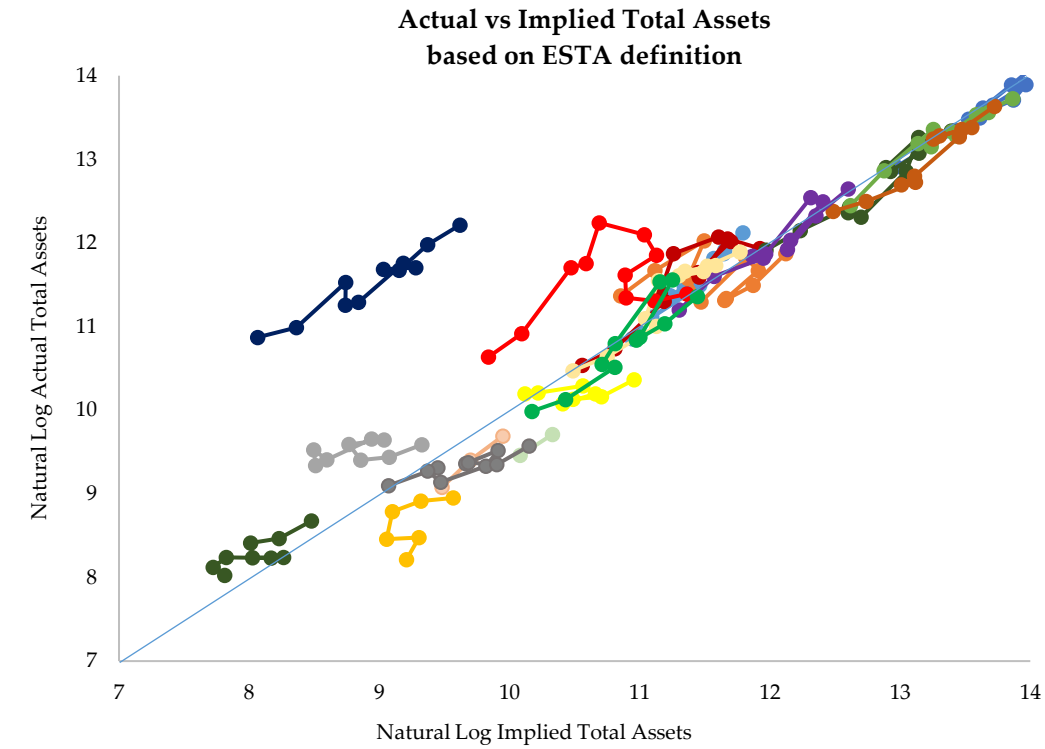
Figure 5.3 shows the relationship between Actual Total Assets and Implied Total Assets in the top panel and the corresponding relationship when intra-Eurosystem transactions are consolidated in the bottom panel. It is evidently clear that actual total assets are more divergent from Implied Total Assets when intra-ES claims are consolidated. In other words, in general, the share of actual total assets less intra-ES transactions of each EANCB move less in line with the capital share of each EANCB.

The relationship between Actual Total Assets and Implied Total Assets is investigated by applying the same estimation framework and methodological framework that was applied in the previous Section. In other words, the ten Models described in Table 5.3 are estimated.

The speed of adjustment estimated by Model 1 of 45 per cent is slightly lower than that resulting from the non-consolidated data. A similar result is obtained in the case of the PAM whereby the speed of adjustment is 73 per cent as compared to 82 per cent in the case of non-consolidated data. In the case of the other heterogeneous Models (Model 2, 3 and 4) the speed of adjustment is close in both investigations.

Minimal difference is noted in the speed of adjustment estimated by the One-Way and Two-Way Fixed Effects Models (Model 6 and Model 7). The consolidated data adjusts distinctly more slowly in all the three Models with homogeneous coefficients. In particular, the consolidated data adjusts with a speed of adjustment of 11 per cent as compared to 17 per cent in case of Model 8 and with a speed of adjustment of 9 per cent in case of Model 9 and 10 as compared to 15 per cent.

Figure 5.3 The Effect of Consolidating Intra-Eurosystem Transactions



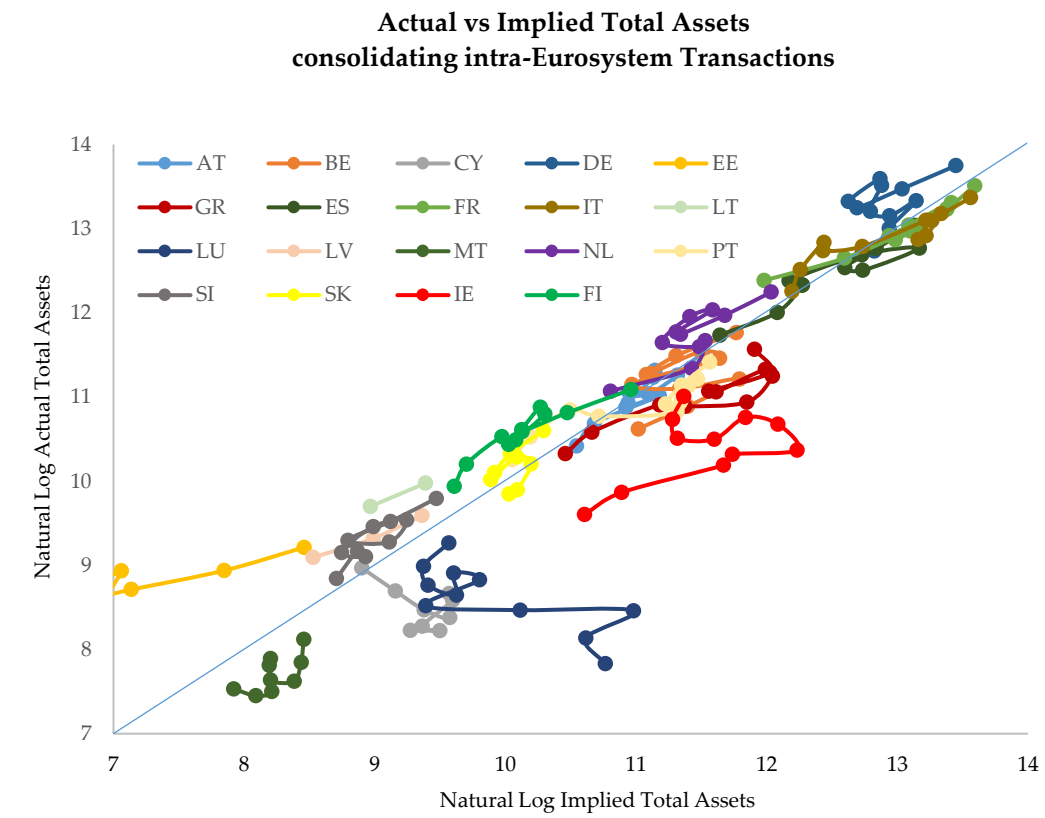


Table 5.14 Mean Group Estimators for Model 1 to Model 5
Consolidating Intra-Eurosystem Claims

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
$\hat{\alpha}$	0.2430	0.9934	0.0280	0.0399	0.0077	0.0362			0.2604	1.2536
$\widehat{\delta_1}$	0.9243**	0.1063	0.9653**	0.1100						
$\widehat{\delta_2}$	-0.4993*	0.1242								
$\widehat{\delta_3}$	0.5488**	0.0859								
$\widehat{\lambda\theta}$									0.7008**	0.1230
$\hat{\lambda}$			0.3813	0.0712	0.4131**	0.0612	0.2700**	0.0742	0.7336**	0.0938
Goodness-of-fit statistics for dynamic models										
SER	0.1749		0.1822		0.1930		0.1855		0.1851	
$\bar{R}^2$	0.9674		0.5337		0.4767		0.0527		0.0566	
BIC	0.7196		0.4860		0.6012		-0.1674		0.1808	
Akaike	-0.3606		-0.3242		-0.2089		-0.4374		-0.3592	

Asterisks indicate significance level on 2-tailed test: *=10%; **=5%

From this analysis, one can deduce that when the intra-Eurosystem transactions are consolidated, the Actual Total Assets take more time to adjust to the Implied Total Assets and therefore to revert to the levels as determined by the capital key. This implies that the balance sheet of each individual EANCB adjusts to reflect their capital share more quickly than revealed by simply looking at the consolidated data. This supports earlier conclusions that when the intra-Eurosystem transactions are consolidated, the rather strong link that is identified between the total assets of each EANCB and their respective share of the ECB's capital is hidden.

Table 5.15 Fixed Effects Estimators: Model 6 and Model 7
Consolidating Intra-Eurosystem Claims

	Model 6 One-way Fixed Effects		Model 7 Two-way Fixed Effects		
	Coeff.	S.E.	Coeff.	S.E.	
$\widehat{\delta_1}$	0.9416**	0.1072	0.5026	0.8120	
$\widehat{\delta_2}$	-0.6955**	0.1204	-1.1385	0.7479	
$\widehat{\delta_3}$	0.6806**	0.0744	0.7041**	0.0782	
$\widehat{\alpha_0}$			10.9269	5.8615	
			FE (cross)	FE (period)	
$\widehat{\alpha_0}$ – AT	0.7992	0.7810	-0.6515	2	-0.4909
$\widehat{\alpha_0}$ – BE	0.8249	0.7960	-0.4392	3	-0.1901
$\widehat{\alpha_0}$ – FI	0.6518	0.7526	-1.1749	4	-0.0876
$\widehat{\alpha_0}$ – FR	1.0174	0.9199	1.2666	5	-0.0667
$\widehat{\alpha_0}$ – DE	0.8164	0.9427	1.3253	6	0.0457
$\widehat{\alpha_0}$ – GR	0.9948	0.7788	-0.4773	7	0.1964
$\widehat{\alpha_0}$ – IE	1.0774	0.7375	-0.9282	8	0.1380
$\widehat{\alpha_0}$ – IT	0.9713	0.9107	1.1065	9	-0.0032
$\widehat{\alpha_0}$ – NL	0.7717	0.8323	-0.0689	10	0.1231
$\widehat{\alpha_0}$ – PT	0.8693	0.7721	-0.6875	11	0.3354
$\widehat{\alpha_0}$ – ES	0.9507	0.8817	0.7291		

Goodness-of-fit statistics for dynamic models		
SER	0.1815	0.1860
$\bar{R}^2$	0.9649	0.9631
BIC	-0.1133	0.2226
Akaike	-0.4570	-0.3420

Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

Table 5.17 presents the two model selection criteria – AIC and BIC. In both cases, Model 10 – the most restricted model – is again the preferred model. This model was also the preferred model in the case of the previous analysis concerning the non-consolidated data.

Since the analysis in both Section 5.4 and 5.5 have the same dependent variable and the same number of observations, it is possible to compare the AIC and BIC of the two explanatory variables (Table 5.12 and Table 5.17). Model 10 estimated by the gross data (intra-Eurosystem transactions are not consolidated) gives the lowest AIC and BIC and therefore fits better than when using the consolidated data. It is also

striking that using the consolidated data, the goodness-of-fit of Model 8 (as captured the the equation standard error) worsens, rather than improves, compared to the fixed effects estimates of Models 6 and 7, implying that countries' Adjusted Capital Keys do a less good job in capturing variation across the cross section. This is also clearly evident in the comparison shown in Figure 5.3.

Table 5.16 Pooled OLS Estimators: Model 8 to Model 10
Consolidating Intra-Eurosystem Claims

	Model 8		Model 9		Model 10	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
$\widehat{\alpha_0}$	0.1945	0.2199	0.0086	0.0179		
$\widehat{\delta_1}$	0.9910**	0.0964				
$\widehat{\delta_2}$	-0.8987**	0.1010				
$\widehat{\delta_3}$	0.8919**	0.0387				
$\hat{\lambda}$			0.0964**	0.0360	0.0938**	0.0355
Goodness-of-fit statistics for dynamic models						
SER	0.1865		0.1854		0.1847	
$\bar{R}^2$	0.9630		0.0536		0.0602	
BIC	-0.3872		-0.4658		-0.5064	
Akaike	-0.4854		-0.5149		-0.5310	

Asterisks indicate notional significance level on 2-tailed test: *=10%; **=5%

Table 5.17 Summary of Results – Model Selection
Consolidating Intra-Eurosystem Claims

	Akaike Information Criterion (AIC)	Schwarz Bayesian Information Criterion (BIC)
Assumption 1: Heterogeneous Coefficients		
Model 1	-0.3606	0.4338
Model 2	-0.3242	0.2400
Model 3	-0.2089	-0.0670
Model 4	-0.4374	-0.4510
Model 5	-0.3592	0.3626
Assumption 2: Heterogeneous Intercept and Homogeneous Slopes		
Model 6	-0.4570	-0.3403
Model 7	-0.3420	-0.0434
Assumption 3: Homogeneous Coefficients		
Model 8	-0.4854	-0.6885
Model 9	-0.5149	-0.7564
Model 10	-0.5310	-0.7991

5.6. Concluding Remarks

An econometric investigation of the correlation between the share of total assets of each EANCB to Eurosystem total assets and their respective Capital Key confirms the conclusions reached in the previous Chapter.

By estimating a number of models that vary in their form and in the degree of homogeneity of the coefficients, it has been shown that the short and long-run elasticity of Actual Assets to Implied Assets is very close to one. The equation shows two sorts of adjustment. The short run adjustment coefficient β measures how the change in Actual Assets responds to change in the equilibrium value. The pooled results show that short run adjustment is very fast, not significantly different from one, with Actual Assets responding almost immediately to Implied Assets, though with some errors. The long run adjustment coefficient λ measures how fast these errors, the lagged differences between actual and equilibrium are removed. On average across countries this is quite slow at between 15 per cent per period (pooled estimate in Model 10) and 32 per cent (Mean Group Estimator in Model 4). While individual country parameters are imprecisely estimated – which is to be expected, given the very low degrees of freedom for individual country equations - differences between countries are not statistically significant (both country and time fixed effects are individually and collectively insignificant) and so pooled models work well. Both goodness-of-fit and information criteria clearly prefer a pooled model with homogeneous coefficients to heterogeneous models.

Chosen by the AIC and BIC selection criteria, the preferred model has homogeneous coefficients, unit short and long-run coefficients on ITA and partial adjustment to the long-run equilibrium both when defining the Eurosystem as ESTA (Section 5.4) as well as when using the data published by the ECB (Section 5.5). Amongst the 10 Models estimated by these two sets of data, the preferred Model clearly fits better when the intra-Eurosystem transactions are not consolidated.

The striking feature of the results is that in the pooled Model the Adjusted Capital Key, feeding into Implied Total Assets estimates, is the sole explanatory factor of systematic cross-sectional variation, providing strong empirical support to the argument in Chapter 4 that Euro Area National Central Banks effectively act on auto-pilot in expanding their asset base.

Chapter 6

The Transformation of the Euro Area National Central Banks: A Comparative Analysis

The severity of the global financial crisis that began in 2007 challenged central banks to use both standard and non-standard measures to address the economic effects of the crisis and the sluggish recovery. As this brought about dramatic quantitative expansion of the balance sheets of "main" central banks such as the Eurosystem, the Bank of England and the Federal Reserve, the analysis of central bank balance sheets has gained ground. The events that unfolded during the financial crisis led to increasing recognition that, as emphasized by Bindseil (2004), 'whenever a central bank transacts with the rest of the world – that is when it issues currency, conducts foreign exchange operations, invests its own funds, engages in emergency liquidity assistance, and, last but not least conducts monetary policy operations – all of these operations affect its balance sheet'.

As monetary policy measures have been adapted to the institutional conditions, economic specifics and financing structure which characterize an economy, the design in balance sheet policies has differed substantially across central banks. In this regard, the literature is no longer limited to a discussion of developments in total assets of central banks but elaborates upon the compositional changes of central bank balance sheets. Indeed, recent events have shifted the interpretation of the stance of

monetary policy from one focused almost exclusively on changes in a policy interest rate, to one where the size and composition of central banks' balance sheets is more relevant (Ademuyiwa, Siklos and St. Amand 2018).

As it has been recognized that merely looking at the total size of the balance sheet does not reveal what was actually happening within the balance sheet of the central bank, the literature focusing on the composition of the central bank balance sheets has surged. However, with respect to the Euro Area, the focus has so far remained on the composition of the Eurosystem balance sheet in aggregate while no comprehensive analysis amongst the Euro Area NCBs has been attempted and therefore the implications of such an analysis remain widely neglected. This Chapter attempts to rectify this omission.

To this effect, this study builds upon what has already been presented in earlier Chapters – an analysis of the individual NCBs that form the Eurosystem (EANCBs). At the same time, this Chapter is distinct from the previous ones in that it conducts a detailed comparative analysis of developments in both the size and the composition of the balance sheets of the EANCBs.

The contribution of this Chapter is threefold. As this Chapter uses a unified framework presented by Pattipeilohy (2016) in his analysis of developments in central banks' balance sheet composition, it presents a general summary of this framework and discusses why, as admitted by Pattipeilohy in his 2016 study, it is not designed for the EANCBs – it does not account for all the information on the balance sheets of central banks operating within a system. Secondly, this Chapter rectifies this by proposing an alternative framework and applies it for the EANCBs, revealing some interesting points. Thirdly, despite that Pattipeilohy's Framework (PF) was earmarked for "main" central banks, this Chapter finds some validity in its application for the EANCBs. It serves to highlight some interesting insights on the gearing of domestic assets and liabilities on the EANCBs' balance sheets towards different macroeconomic sectors (the banking and government sectors).

During the recent crisis, central bank actions differed with respect to their relative emphasis given to private versus public sector securities as well as to bank versus non-bank markets[65]. Against this background, the framework presented by Pattipeilohy (2016) (summarized in Table 6.1) classified the balance sheet items into holdings of foreign exchange and domestic assets, the latter being again sub-divided into private sector debt (G) and public sector debt (L). Foreign exchange reserves constitute assets denominated in foreign currency and assets issued by foreign counterparties. Concerning domestic assets, private sector debt (L) usually refers to loans to or debt securities issued by banks and other financial intermediaries. Central bank holdings of precious commodities such as gold are also included under this category. On the liabilities side of the balance sheet, the distinction is made between base money, that is, the provision of banknotes (Bn) and non-banknote central bank liabilities. Pattipeilohy's Framework classified the latter by counterparty – liabilities to banks (Rs) and liabilities to the government (Rg). In sum, Pattipeilohy's Framework (PF) structured the balance sheets of "main" central banks such as the Eurosystem, the Bank of England and the Federal Reserve, as presented in the upper part of Table 6.1, that is, consisting of FX, L and G on the assets side and Bn, Rs and Rg on the liabilities side.

Table 6.1 Simplified Euro Area National Central Bank Balance Sheet Pattipeilohy's Framework (PF)

Assets		Liabilities	
Foreign Exchange Reserves[66]	FX	Banknotes in Circulation	Bn
Domestic Private Sector Debt	L	Liabilities to the Banking Sector	Rs
Domestic Public Sector Debt	G	Liabilities to Government	Rg
Intra-Eurosystem Claims	ES_C	Intra-Eurosystem Liabilities	ES_L
Other Assets	OA	Other Liabilities	OL

Source: Pattipeilohy C. (2016) for upper part and own insertions for lower part of the balance sheet

[65] For example, the Federal Reserve focused heavily on non-bank credit markets and on operations involving private sector securities. In contrast, the Bank of Engalnd has concentrated its Asset Purchase Facility entirely on purchases of government bonds while the ECB emphasised banking system liquidity, purchases of covered bonds and later sovereign bonds.

[66] Whereas in Pattipeilohy (2016) this category includes 'Other Assets', these are considered as a separate category in the application of the PF presented later on in this Chapter.

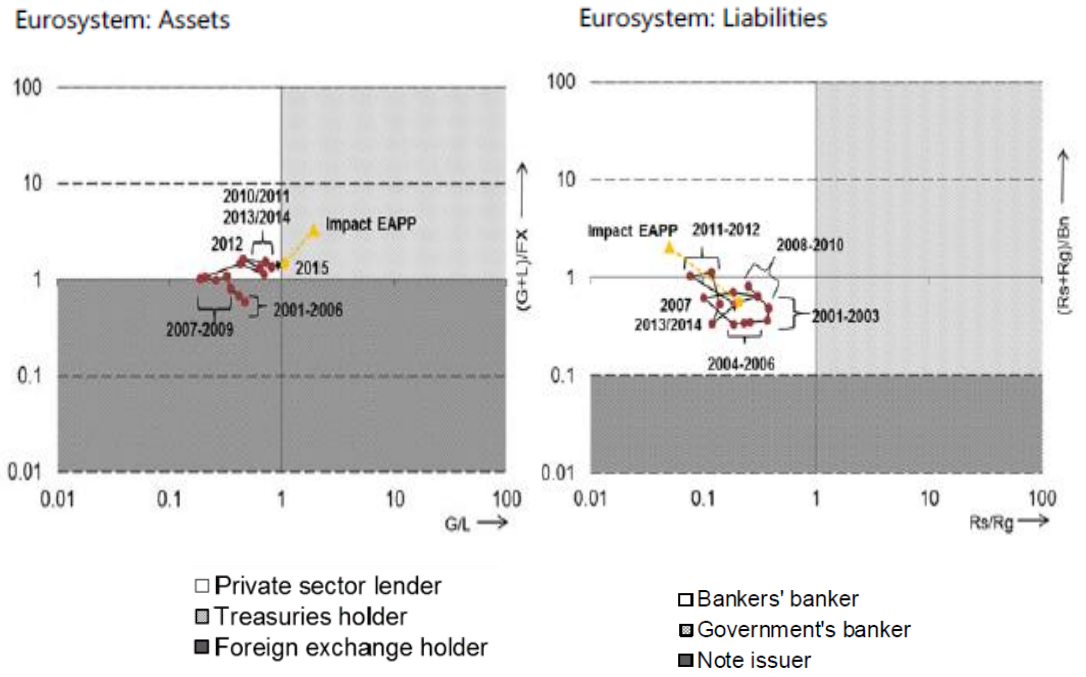
One point which is crucial to the analysis that follows in this Chapter, is the fact that Pattipeilohy (2016) based the analysis for the Euro Area on the consolidated balance sheet of the Eurosystem, net of intra-Eurosystem positions (as published by the ECB). He documents his exclusion of information on the balance sheets of individual EANCBs and, while justifying this position on the grounds that they are jointly responsible for the implementation of the ECB's single monetary policy, he hints that a method is to be found on how to classify intra-Eurosystem assets and liabilities but, as he puts it: 'this is as yet rather unclear'. Because of this, the balance sheets of EANCBs are not treated exhaustively when applying Pattipeilohy's Framework to the EANCBs – Intra-Eurosystem Claims/Liabilities[67] and other Assets/Liabilities are not included in the analysis. This point is reflected in the way the simplified balance sheet of EANCBs is presented in Table 6.1. While the upper part shows the items taken into account by the PF, the lower part is included here merely for the sake of presenting a complete balance sheet despite that these items were excluded from Pattipeilohy's original analysis.

Indeed, the above is the gap in the literature which this Chapter attempts to address when proposing a new alternative framework designed specifically for the EANCBs.

Based on the categorization of assets and liabilities as in Table 6.1, the construction of balance sheet ratios and a set of rules underlying a classification scheme (refer to Section 6.2 and Appendix 6.1 for further details) Pattipeilohy (2016) classified central banks in terms of their asset holdings as being either Foreign Exchange Holders (FXH), Treasury Holders (TH) or Private Sector Lenders (PSL). Based on the composition of the liabilities side, central banks are categorized as being either Note Issuers (NI), Government's Bankers (GB) or Bankers' Bank (BB). In his 2016 study, which covers a panel of fourteen central banks from advanced economies and twenty from emerging market economies, Pattipeilohy (2016) documented a convergence in the balance sheet composition among advanced economies between 2007 and 2009, on the back of a fairly homogeneous response to the crisis driven by financial stability

[67] Detailed discussion on Intra-Eurosystem Claims/Liabilities is presented in Chapter 4.

concerns. Subsequently, however, this convergence was somewhat reversed as more diverse balance sheet policies were adopted, reflecting the diversified policy challenges faced by the advanced economies. Conversely, the composition of balance sheets of central banks in emerging market economies remained relatively unchanged over the same period. Pattipeilohy (2016) also observed that the size of the balance sheet expansion is not necessarily reflected in the extent to which the balance sheet composition changes. The scales in the Figure below are denoted in logarithms in order to ensure that a change in any variable leads to a similar shift in the graphs, irrespective of the starting value of the respective indicator.



In the images above taken from Pattipeilohy's 2016 study, with respect to the composition of the asset side of the balance sheet, central banks that are classified as Foreign Exchange Holders feature in the lower darker section of the charts, central banks classified as Treasuries Holder are plotted in the upper right segment while those classified as Private Sector Lenders feature in the upper left segment. On the liabilities side, the lower darker segment indicates central banks who are Note Issuers, the upper right segment plot central banks who are Government's Bankers and the upper left segment represents central banks classified as Bankers' Bankers. Before the crisis, the (consolidated) Eurosystem was an FX Holder in terms of asset composition and Bankers' Banker in terms of liability composition. These diagrams

also show that in the midst of the financial crisis (2009 – 2011), the Eurosystem increased its holdings of domestic government bonds (eastward shift) coupled with a westward shift on grounds of the introduction of two very long-term refinancing operations in late 2010/early 2011. As of mid-2015, the Eurosystem has become a Treasuries Holder as the APP was skewed towards government bonds. In terms of changes in liability composition, the right hand panel shows that by mid-2015 the Eurosystem's relative liability structure was similar to the one observed in 2007. Similar to the asset side, the APP also implied a significant shift in liability composition.

As the global financial crisis unfolded, the operation of EANCBs within a system of central banks brought to the forefront an increasingly more important category of lending and borrowing by EANCBs – intra-Euro Area cross-border transactions (besides domestic and extra-Euro Area cross-border positions). Therefore, this Chapter proposes a new framework that includes new categorization of the central bank balance sheets items to examine the position of each EANCB vis-à-vis the rest of the central banks within the system.

This new proposed framework and the computation of a set of balance sheet indicators summarizing EANCBs' balance sheet configuration (building on the methodology in Pattipeilohy, 2016) reveals a number of interesting points:

(i) The compositional changes in the EANCBs' balance sheet have been at least somewhat predictable; during the financial crisis EANCBs in the 'core' countries engaged more in lending activity and held larger cross-border positions; EANCBs in 'peripheral' countries held predominantly domestic assets and were borrowing institutions issuing cross-border liabilities.

(ii) Cross-border activity was more dominant during the years of intense financial crisis.

(iii) Greece, Italy, Portugal and Spain (GIPS) held predominantly domestic asset positions throughout the period; other countries engaged in intense

cross-border activity during the worst years of the crisis but this lessened again as the crisis died out;

(iv) While prior to the financial crisis, most EANCBs were Note Issuers, in the first few years of the crisis, most of them were holding both domestic and cross-border liabilities, though subsequently, most of their liabilities were predominantly cross-border positions. Over the latter years to 2016, there was a shift back towards issuing domestic liabilities.

(v) The rather dramatic changes in the EANCBs' balance sheet composition are hidden in the Eurosystem balance sheet.

The remainder of this Chapter is organized as follows: Sub-Section 6.1.1 aims to put the analysis into the right context by first presenting a brief review of the literature that assesses the composition of central balance sheets by using different central bank balance sheet ratios. Sub-Section 6.1.2, briefly discusses the validation (or lack of it) of Pattipeilohy's Framework for a system of central banks such as the Eurosystem, introduces the proposed alternative framework and discusses its application for EANCBs. (A detailed description of the methodology is presented in Appendix 6.1 and 6.2). This sub-Section concludes with a further discussion on the implications of the new insights that emerge from the application of the proposed framework (sub-Section 6.1.3). Having identified some validity in the application of Pattipeilohy's Framework (PF) for the EANCBs, Section 6.2 discusses this and outlines a number of interesting insights.

The remainder of this Chapter (Section 6.3) takes a closer look and presents further details on the extension to the existing dataset (presented in Chapter 3) that was necessary to conduct this analysis. This Section also discusses a number of caveats. Finally, Section 6.4 concludes.

Appendix 6.1 to this Chapter presents the methodology adopted in applying both frameworks in further detail, documenting the meticulous work, which is involved in categorizing all the balance sheet items, computing the balance sheet ratios and

classifying the EANCBs according to a set typology (which is only broad-brushed in Chapter 6). Appendix 6.2 presents details on the differential classification of the Asset Purchase Programmes, which differs across EANCBs. Other Appendices to this Chapter present more details on the results (Appendices 6.3, 6.4, 6.5 and 6.6). Appendices 6.7and 6.8 present the main categories of assets and liabilities for each EANCB as defined by the PF and the new proposed framework in Tables 6.1 and 6.2 respectively. Appendix 6.9 presents all the items on the balance sheet of each EANCB grouped according to the categories defined in the new framework (Table 6.2).

6.1 Central Bank Balance Sheet Ratios: the Literature and the Move to a New Proposed Framework

6.1.1 Pattipeilohy's Approach in a Broader Context

As touched upon in Chapter 2, recent years have witnessed the emergence of a particular strand in the literature, which examines the compositional changes of central bank balance sheet policies, going beyond a qualitative discussion of recent policy measures. In the early years of the financial crisis, Stella (2009) introduced the idea of analyzing the transformation of the components of the central bank balance sheet beyond the headline number of total assets. Indeed, he analyzed the Federal Reserve balance sheet transformation over the 1951-2008 period suggesting alternative metrics to judge both the scope of the Fed's role in the financial system as well as the exposure of its balance sheet to risk. Subsequently, in 2013, a more systematic approach in analyzing the composition of central bank balance sheets as an indicator of the aggressiveness of the policy efforts of the monetary authorities was put forward by Pattipeilohy (2013), making use of an indicator-based methodology.

In his study, Pattipeilohy (2013) analyzed historical developments in the balance sheet of De Nederlandsche Bank over the 1990-1998 period. Immediately afterwards, in a further study Pattipeilohy et al (2013) analyzed balance sheet developments of

central banks of major advanced economies since the crisis. Pattipeilohy (2016) augmented the methodology employed in these two papers in another study whereby central bank balance sheet composition was summarized by four parameters (rather than the initial three). This latter study presented a first attempt to analyze changes in the overall central bank balance sheet configuration across a broad panel of central banks in a unified quantitative framework. This framework serves as the basis of the analysis in this Chapter and therefore, was synthesized briefly in the introduction to this Chapter.

Very limited applications of Pattipeilohy's Framework are found in the existing literature. Kondratenko and Kostadinoska-Miloseska (2017) applied this framework for six EU Member States based on data from the central banks' balance sheets. They concluded that during the crisis, these countries modified their monetary policy framework leading to changes in both the size and structure of their balance sheets. Another preliminary study by Soederhuizen and Arnold (2017) applies Pattipeilohy's Framework to the national central banks in the Euro Area and the Federal Reserve Banks. However, as discussed in the following sub-Section and in line with Pattipeilohy's remarks, this framework does not account for all the information on the balance sheets of Euro Area national central banks.

A more recent study by Kiss and Balog (2018) also presented an application of balance sheet ratios to examine the different policy implications of balance sheet expansion and the impact on currency stability. This paper used six balance sheet ratios[68] to capture developments in balance sheets of seven non-Euro Area NCBs during the 2006-2014 period. They pointed out that balance sheet ratios can be biased by the enormous foreign exchange reserves but their changes were still used to test the interactions between structural changes of central bank balance sheets and currency stability.

[68] Equity-to-debt ratio, transparency ratio, defence ratio, lending-to-assets ratio, securities-to-assets ratio and asset expansion.

Ademuyiwa, Siklos and St. Amand (2018) also explored central bank balance sheet ratios and examined the challenges of interpreting the conduct of recent monetary policy for more than 30 central banks, five of which were in the Euro Area. Their paper presented a dataset of main balance sheet items mainly central bank total assets, central bank private sector and public sector assets and net worth. It concluded with a word of caution on the interpretation of changes in central bank balance sheets composition, emphasizing that their significance should not be exaggerated. Finally, Ademuyiwa, Siklos and St. Amand (2018) found that balance sheet expansions are associated with higher output volatility and that central bank's ability to minimize inflation and output variability may have been impaired by efforts towards achieving the desired global financial stability conditions.

Parallel to the above-mentioned studies, Bagus and Howden (2009) presented a standard set of tools to conduct a comparative analysis of the balance sheets of the Fed and the Eurosystem from the beginning of the crisis in June 2007 to March 2009. By observing a set of balance sheet ratios, they concluded that considering only quantitative issues (and ignoring regulatory changes), the Eurosystem has emerged marginally better throughout the first two years of the crisis than the Fed in terms of foreign exchange reserves and liquidity of its assets. In a more recent theoretical paper, they extended their earlier standard set of tools to analyze the central bank's balance sheet (Bagus and Howden, 2016) consisting of strength, liquidity and equity ratios which are useful in the analysis of the financial stability of a central bank.

As highlighted in Chapter 2, this Chapter contributes to this strand of literature by giving prominence to a rather neglected aspect being the composition of the EANCBs' balance sheets and the interlinkages between them and the Eurosystem as a whole. The dataset presented in Chapter 3 (and extended here) plays a crucial role in this analysis since the application of the indicator-based methodology would not have been feasible without first collating all the data in the EANCBs' balance sheets.

6.1.2 Moving from Pattipeilohy's Framework to a New Proposed Framework – A Framework for Euro Area National Central Banks (FEANCB)

Why Depart from Pattipeilohy's Framework?

As briefly outlined earlier, Pattipeilohy's Framework core concept is to break down the central bank balance sheet by taking a counterparty perspective, that is, by considering the extent to which central bank assets and liabilities are geared towards different macroeconomic sectors. In this case, except for foreign exchange reserves, all other assets are assumed to be 'domestic', usually referring to loans to or debt securities issued by banks and other financial intermediaries within the same jurisdiction. On the liabilities side, non-banknote central bank liabilities are classified by counterparty – liabilities to banks and liabilities to the government.

Pattipeilohy's Framework is designed for central banks whose assets involve either foreign exchange reserves (assets denominated in foreign currency and assets issued by foreign counterparties) or domestic assets and therefore any transactions between central banks fall under the category of foreign exchange reserves. In contrast, however, a national central bank which operates as part of the Eurosystem, engages in transactions with banks and governments in other Euro Area Member States (besides transactions with domestic banks and the local government and with counterparties outside the Euro Area). These transactions related to payments between one Euro Area national central bank and institutions/counterparties within another Euro Area Member State (referred to as cross-border payments) give rise to Intra-Eurosystem claims/liabilities, which are ignored in Pattipeilohy's Framework.

During the financial crisis, the importance of this distinction between local counterparties and counterparties outside the jurisdiction of the EANCB became even more accentuated as most of the Asset Purchase Programme (APP) involved the purchase by one EANCB of securities issued by institutions within other Euro Area Member States and therefore giving rise to intra-Euro Area cross-border positions.

Indeed, intra-Euro Area cross-border claims reached a high of 95 per cent of the total central bank balance sheet of Luxembourg (2015, 2016), 87 per cent of the balance sheet of the Finnish central bank (2011) and 75 per cent and 71 per cent of the central bank balance sheets of NL (2011) and DE (2013) respectively.

In a nutshell, while Pattipeilohy's Framework is valid for "main" central banks, the NCBs operating within the Eurosystem require a new framework that distinguishes between transactions involving EANCBs and other central banks/counterparties outside the system and transactions between EANCBs (operating within the same system). The following sub-Section describes this new proposed framework and the results that emerge following a diagnostic and graphical approach similar to that in Pattipeilohy's 2016 study.

The Framework for Euro Area National Central Banks (FEANCB)

The new alternative framework proposed in this Chapter, which I shall refer to as the Framework for Euro Area National Central Banks (FEANCB), distinguishes between balance sheet positions as follows:

a) Domestic positions
b) Intra-Euro Area cross-border positions and
c) Extra-Euro Area cross-border positions.

Put differently, the balance sheet positions of each EANCB that result from euro-denominated transactions between that EANCB and institutions (banks and government) established within the same EA Member State are categorized as domestic positions. In other words, claims against local banks, non-financial residents and national governments are amalgamated into the category 'Domestic Assets'. This was necessary for presentation purposes as the methodology used in the analysis does not allow for further sub-categorization and follows the precedent set by Pattipeilohy's Framework. Meanwhile, balance sheet positions resulting from Euro-denominated transactions between a particular EANCB and institutions

established outside that EA Member State (but within the Euro Area) are categorized as intra-Euro Area cross-border positions. For simplification, it is assumed that no Euro-denominated transactions take place between EANCBs and institutions established in jurisdictions outside the Euro Area (therefore extra-Euro Area cross border positions are assumed zero). While published data by the Central Banks do not provide enough information, such assumption is considered plausible. Balances that are not considered as either Foreign Assets, Domestic Assets or Intra-Euro Area cross border positions amounted to a mere 5 per cent of total Eurosystem assets in 2016. Thus, Extra-Euro Area cross-border positions, which are assumed to be zero in this analysis, by definition, do not exceed 5 per cent of total Eurosystem assets. Table 6.2 presents a simplified balance sheet structured to reflect the above specificities of the national central banks operating within a system of central banks.

Table 6.2 Simplified Euro Area National Central Bank Balance Sheet Framework for Euro Area National Central Banks (FEANCB)

Assets		Liabilities	
Foreign Exchange Reserves	A_{FX}	Banknotes in Circulation	L_B
Domestic Assets	A_{DOM}	Liabilities to domestic institutions	L_{DOM}
Cross-Border Assets	A_{CB}	Cross-Border Liabilities	L_{CB}
Other Assets	A_O	Equity	Eq
		Other Liabilities	L_O

Source: own compilation

As explained earlier, apart from foreign exchange reserves (A_{FX}), assets on the central bank balance sheet are categorized as either involving transactions with institutions within the same jurisdiction (referred to as Domestic Assets A_{DOM}) or transactions with institutions in other Euro Area Member States (referred to as intra-Euro Area Cross-Border Assets A_{CB}). In this way, this alternative framework distinguishes between whether an EANCB provides liquidity to the local banking sector and the national government or to the banking sector and the governments of other Euro Area Member States. This issue becomes crucial since, as already highlighted in previous Chapters, a number of EANCBs played a significant role in contributing towards the survival of other EANCBs within the 'periphery' countries during the

Table 6.3 Detailed Euro Area National Central Bank Balance Sheet Based on Pattipeilohy's Framework and the Framework for Euro Area National Central Banks (FEANCB)

PF*	FEA NCB*	Assets	Item No.**	PF*	FEA NCB*	Liabilities	Item No.**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FX	A_{FX}	Gold and Gold Receivables	1	Bn	L_B	Banknotes in Circulation	1
		Claims on non-Euro Residents in Foreign Currency	2				
		Claims on EA Residents denominated in Foreign Currency	3				
	A_{CB}	Claims on non-Euro Residents in Euro	4	NA	L_{CB}	Intra-Eurosystem Liabilities	9
NA		Intra-Eurosystem Claims	9				
L	A_{DOM}	Lending to EA Credit Institutions re to Monetary Policy Operations in Euro	5	Rs	L_{DOM}	Liabilities to EA Credit Inst. re MPO in Euro	2
G		Public Sector Purchase Programme	7.1			Other Liabilities to EA Credit Inst. in Euro	3
		Claims on the National Government	8	Rg		Liabilities to other EA Residents in Euro – General Government	4.1
Ao		Other Claims on EA Credit Inst. in Euro	6				
G	A_{CB}/ A_{DOM}#	Other securities	7.2	Eq	Eq	Revaluation Accounts	13
		Securities Market Prog.	7.1			Capital and Reserves	14
L		Covered Bond Purchase Prog.	7.1			Profit for the Year	15
		Corporate Sector Purchase Prog.	7.1				
Ao	A_O	Items in Course of Settlement	10	L_O	Lo	Other Liabilities	4.2, 5-8, 10-12
FX		Other assets	11				

Source: Pattipeilohy (2016) and own compilation

*These categories are defined in Table 6.1 for PF and in Table 6.2 for FEANCB.

#The classification of these programmes/securities as either A_{DOM} or A_{CB} is discussed in Appendix 6.2.

**This reference number relates to the balance sheet format given in Annex VIII to Guideline (EU) 2016/2249 (ECB/2016/34), OJ L 347, 20.12.2016, p. 3.

NA = Not Applicable;

financial crisis. This alternative framework allows for capturing evidence on this point, and therefore provides a new perspective compared to analysis which focuses solely on the whole Eurosystem.

With respect to the FEANCB, Table 6.3 illustrates how each item on the balance sheets of EANCBs fits into the broad categories presented in Table 6.2. Table 6.3 (first and fifth column) also depicts the categorization of all the balance sheet items into the broad categories defined in Pattipeilohy's Framework in Table 6.1 presented earlier. This categorization according to Pattipeilohy's Framework is discussed in Appendix 6.1.

The Asset Side of the EANCBs' Balance Sheets

As explained earlier, the asset side is divided into three main groups – Foreign Exchange Reserves (A_{FX}), Domestic Assets (A_{DOM}) and Cross-Border positions (A_{CB}) (the latter category including intra-Eurosystem balances) – and a fourth category 'Other Assets' which is excluded from this analysis. The summation of these categories add up to ESTA as shown in the bottom right-hand panel of Figure 6.1, defined in previous Chapters of this thesis. A_{DOM} pertains to debt of domestic institutions (banks and government) while A_{CB} consists of debt issued by institutions in other Euro Area Member States[69]. It is pertinent to note that the classification of most of the purchase programmes being either domestic assets or intra-Euro Area cross-border assets varies from one EANCB to another. Only the PSPP is classified as domestic assets for all EANCBs. Details about how these purchase programmes are classified for each EANCB are explained in Appendix 6.2.

The FEANCB, which is the basis of Figure 6.1, captures the three main categories mentioned above and therefore includes intra-Eurosystem transactions (under the category Cross-Border Positions). Therefore, Figure 6.1 relates to ESTA definition and

[69] Both A_{DOM} and A_{CB} are assumed to be Euro Denominated Assets.

excludes only the minor category 'Other Assets' from the analysis. This contrasts with the PF as explained in the following Section.

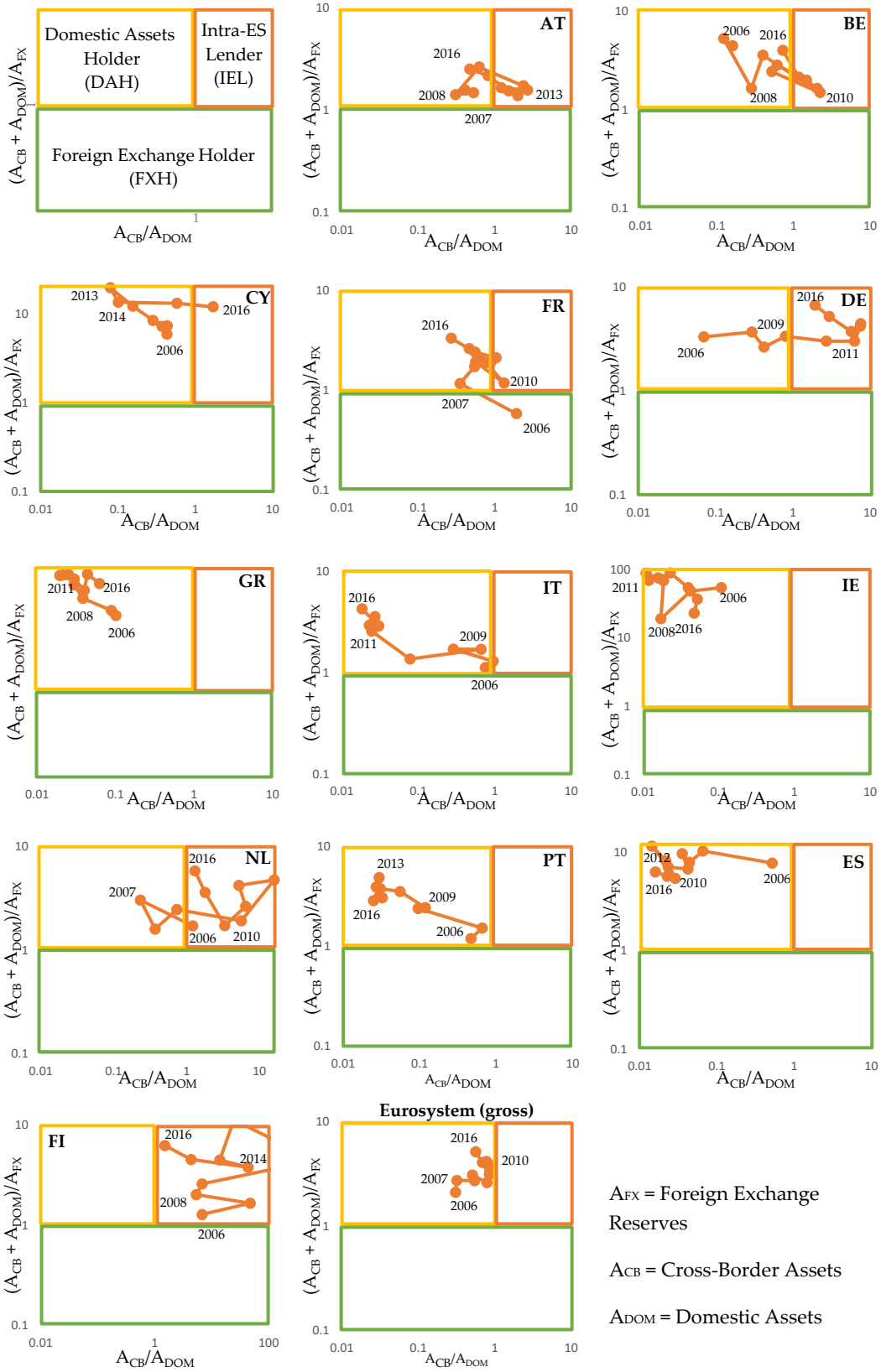
A set of balance sheet indicators is computed enabling the assessment of relative changes in balance sheet composition through time as well as relative differences between EANCBs. These are summarized in Figure 6.1. The following is only a broad-brush description of this set of balance sheet ratios and a corresponding classification scheme, while further details about the methodology employed are presented in Appendix 6.1.

The indicator $(A_{CB} + A_{DOM})/A_{FX}$ is constructed to determine whether the assets side of the balance sheet is predominately dominated by foreign reserves. When the ratio $(A_{CB} + A_{DOM})/A_{FX}$ is less than 1, EANCBs are classified as **Foreign Exchange Holders (FXH)** and depicted in the lower green segment of the charts in Figure 6.1 and 6.2. If more than half of the assets are euro-denominated, then a distinction is made between domestic and cross-border assets by constructing the ratio A_{CB}/A_{DOM}. If $(A_{CB} + A_{DOM})$ exceeds A_{FX} and A_{CB}/A_{DOM} is less than 1, EANCBs are classified as **Domestic Assets Holders (DAH)** and plotted in the upper left segment (yellow). If, on the other hand, the ratio A_{CB}/A_{DOM} is greater than 1, EANCBs are classified as **Intra-Eurosystem Lenders (IEL)** and plotted in the upper right segment (orange) of the charts in Figure 6.1 and 6.2. These national central banks are predominantly holders of Intra-Euro Area cross-border assets. Appendix 6.3 displays these classifications for all EANCBs in tabular form.

From Figure 6.1[70], it is clear that 'periphery' countries like PT, ES, CY[71], GR, IT and IE started out as Domestic Asset Holders and remained as such throughout the period, reflecting increased funding, particularly by these central banks for their banks to

[70] Outliers do not feature in the charts in the following Figures. Details on this matter is presented in Appendix 6.10.
[71] Except for 2016 when it became an IEL.

Figure 6.1 Composition of EANCBs' Assets by Central Bank - FEANCB



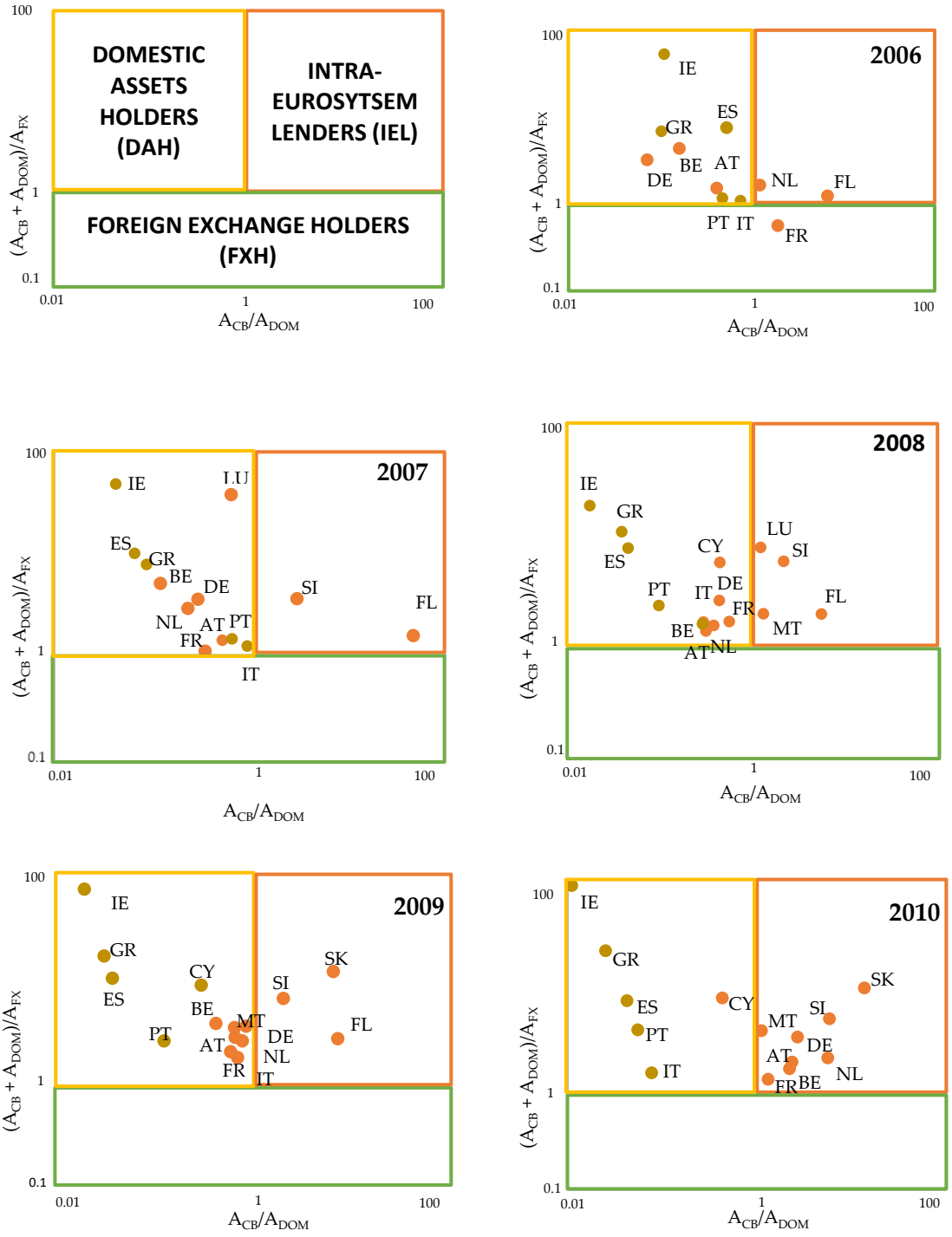
Note: The scales in all the Figures in this Chapter (except Figure 6.5) are denoted in logarithms in order to ensure that a change in any variable leads to a similar shift in the graphs, irrespective of the starting value of the respective indicator. The units are ratios.

cope with deposit flight (with a corresponding increase in Target2 on the liabilities side). In parallel, this gave rise to additional intra-Eurosystem assets on the balance sheet of 'core' countries like DE. As a result, central banks like DE and to a lesser extent NL, despite starting as Domestic Asset Holders, shifted eastward implying a more dominant hold of cross-border assets. More recently, the largest QE programme the PSPP – contributed to an increase in the holdings of domestic assets across all EANCBs but particularly DE, FR, IT and ES. Correspondingly, these events also affected the liabilities side of their balance sheet as discussed in the following sub-Section.

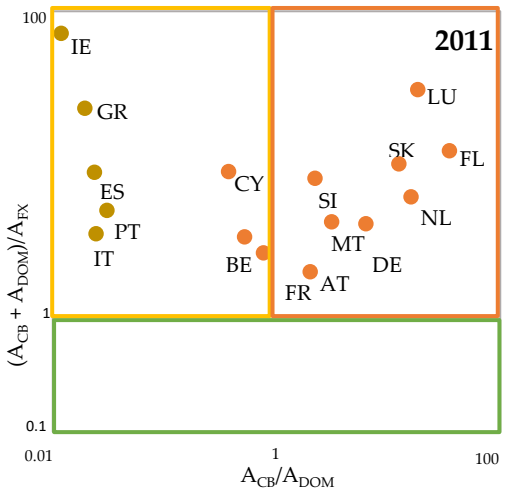
Figure 6.2 clearly illustrates that none of the EANCBs was predominantly holding foreign exchange reserves over the 2006-2016 period, except for France in 2006[72] and Latvia in 2014 when it joined the Euro Area. In the case of the latter, foreign exchange reserves were dominant in 2014, probably as they transitioned from a currency board to a common currency. Subsequently, in 2015 and 2016, this effect was offset as their cross-border assets superseded the foreign component of their balance sheet (which remained relatively stable) reflecting purchases under the SMP in 2015 and 2016. Prior to the crisis and over its first few years, most EANCBs held domestic assets, primarily as the Eurosystem adopted a Fixed Rate Full Allotment (FRFA) policy whereby liquidity was supplied to domestic counterparties in line with their demand (subject to the provision of eligible collateral). This was followed in 2011 by a series of Longer-Term Refinancing Operations (LTRO). However, this coincided with the accumulation of Target2 by some EANCBs such as DE and NL, leading EANCBs to cluster into two groups - Domestic Asset Holders and Intra-Eurosystem Lenders. Unsurprisingly, as the PSPP limited EANCBs to purchase their own country's sovereign bonds, in 2016, most EANCBs again held mostly domestic assets (with the exception of DE and NL whose Target2 claims surpassed domestic assets).

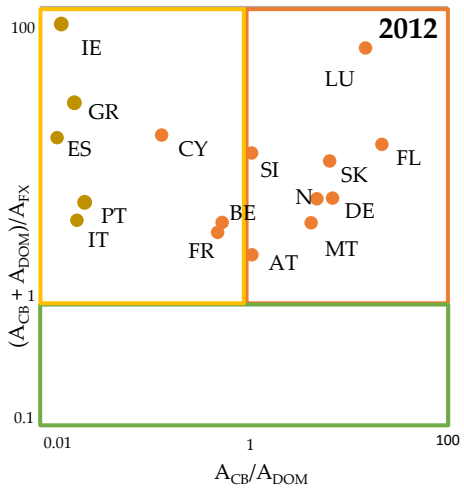
[72]This is on account of relatively low lending to credit-institutions related to monetary policy operations which are classified under domestic assets and which significantly increased over the following years.

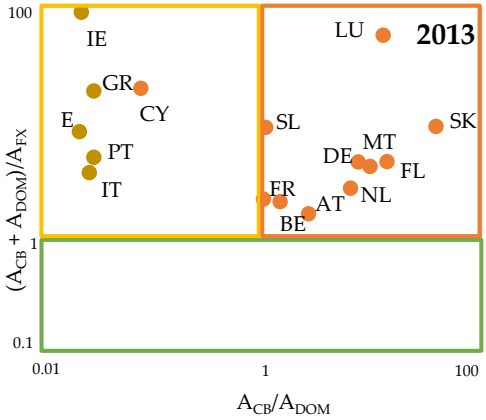
Figure 6.2 Composition of EANCB's Assets: 2006-2016 – FEANCB

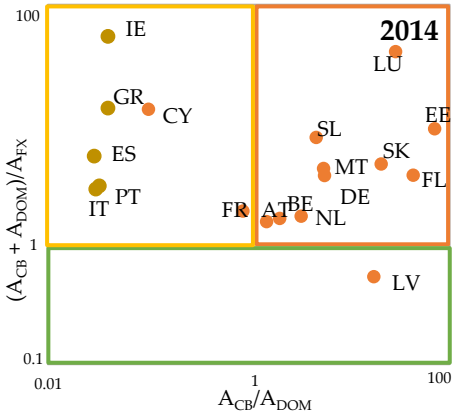


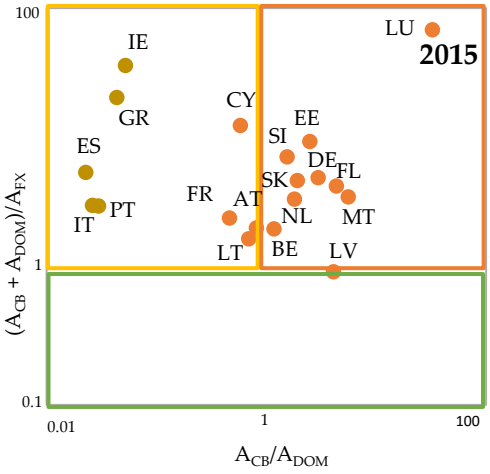
A_{FX} = Foreign Exchange Reserves; A_{CB} = Cross-Border Assets; A_{DOM} = Domestic Assets

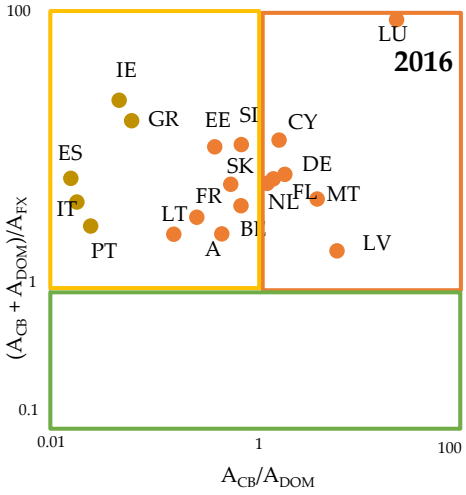












A_{FX} = Foreign Exchange Reserves; A_{CB} = Cross-Border Assets; A_{DOM} = Domestic Assets

Looking at the Eurosystem as a whole, the Eurosystem balance sheet[73] does not reveal the different positions held by the individual EANCBs and the type-switching occurring as a result of the ECB's non-standard monetary policy measures. The Eurosystem balance sheet classified all the EANCBs as being Domestic Asset Holders where "Domestic" has to be interpreted as "anywhere in the Eurosystem". In line with the conclusions reached in previous Chapters, the Eurosystem keeps hidden the fact that some EANCBs engaged in substantial intra-Euro Area transactions, which were crucial for banking sectors in 'peripherial' economies to survive the turmoil of the crisis.

The Liabilities Side of the EANCBs' Balance Sheets

Summarized in Figures 6.3 and 6.4, as defined in Table 6.2 earlier, liabilities on the EANCBs' balance sheets are sub-divided into Banknotes in Circulation (L_B), Liabilities to Domestic Institutions (L_{DOM}) and Cross-Border Liabilities (L_{CB}). Based on these three groups of liabilities, two balance sheet ratios are calculated: $(L_{CB} + L_{DOM})/L_B$ and $(L_{CB}-L_{DOM})/(L_{CB} + L_{DOM})$[74]. If total reserves at the EANCB are less than Banknotes in Circulation $(L_{CB} + L_{DOM})/L_B < 1$, then that EANCB is classified as being **Note Issuer (NI)** and found in the lower green segment of the charts in Figure 6.3 and 6.4. In contrast, if banknotes are less than total reserves, more than half of which are associated with domestic activity, then that EANCB is classified as **Banker for Domestic Counterparties (BDM)**[75] and plotted in the upper left segment (yellow) of the corresponding charts. On the other hand, if more than half of the reserves are related to cross-border activity, then that EANCB is classified as **Intra-Eurosystem Borrower (IEB)**[76] (plotted in the upper right segment (orange) of the charts).

[73]The methodology employed here makes use of balance sheet ratios involving domestic assets and intra-Euro Area cross-border assets. In light of this and given that the Eurosystem balance sheet as published by the ECB consolidates all intra-Euro Area transactions, it is only feasible to analyse the Eurosystem if defined according to the definition described in Chapter 4 – that is, measured as the amalgamation of all the EANCBs and the ECB – referred to earlier as ESTA.

[74] When $(L_{CB}-L_{DOM})/(L_{CB} + L_{DOM}) = 0$, $L_{DOM} = L_{CB}$;

[75] If $(L_{CB} + L_{DOM})/L_B > 1$ and $(L_{CB} – L_{DOM}) / (L_{CB} + L_{DOM}) < 0$ than $L_{CB} < L_{DOM}$.

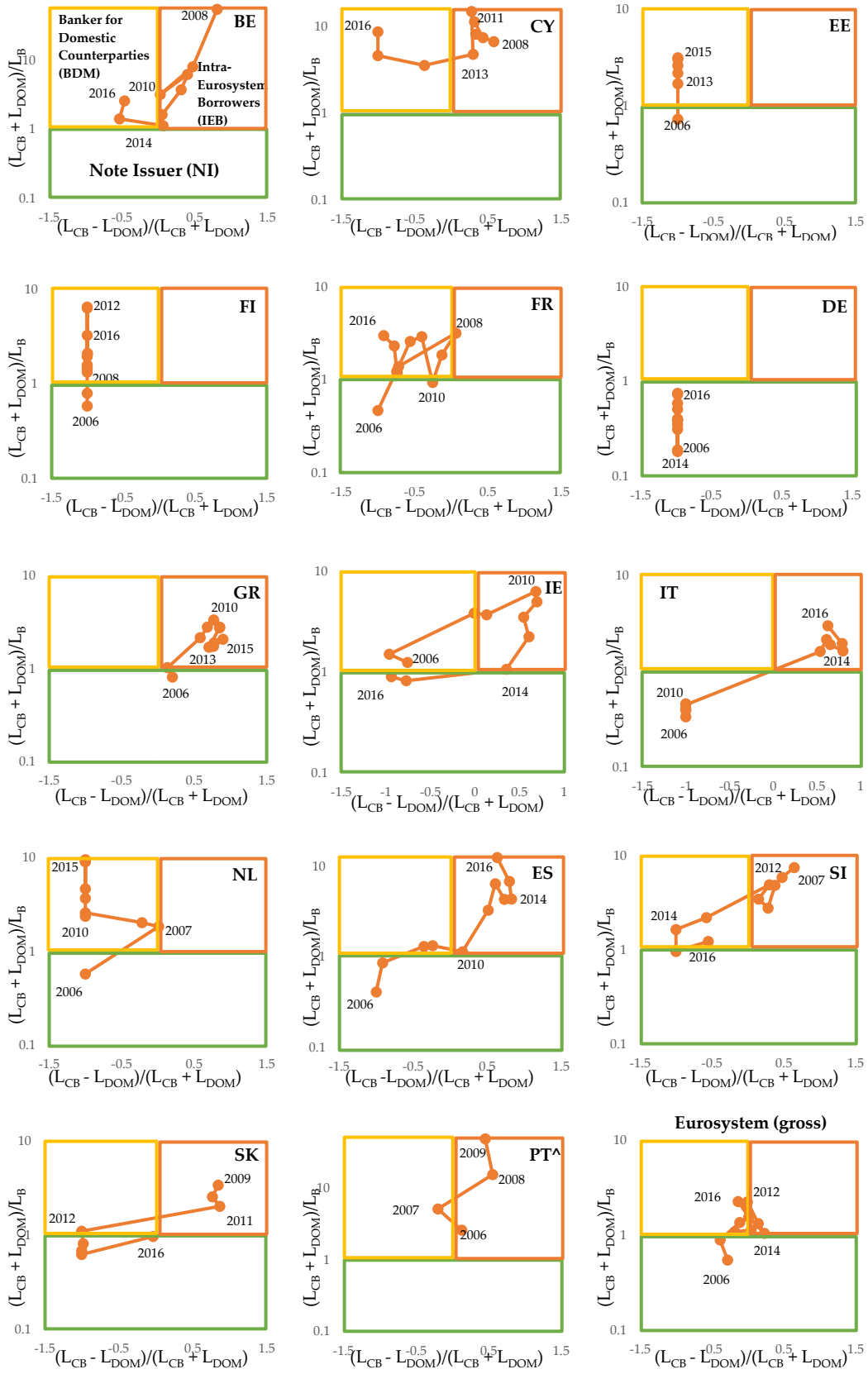
[76] If $(L_{CB} + L_{DOM})/L_B > 1$ and $(L_{CB} – L_{DOM}) / (L_{CB} + L_{DOM}) > 0$ than $L_{CB} > L_{DOM}$.

It is pertinent to note that the three categories of liabilities – L_B, L_{DOM} and L_{CB} – do not cover all the items on the balance sheet (as evident from Table 6.3). One other main category – Equity – is not included in this analysis. The non-exhaustive classification employed here follow the same approach in Pattipeilohy's 2016 study. This does not have an impact on the results of this investigation, since this category is smaller than at least one of the other categories, L_B, L_{CB} and L_{DOM} for all EANCBs across the entire period under review.

Despite that in 2006, prior to the financial crisis, most EANCBs were Note Issuers, only DE and LU remained Note Issuers for almost the entire period under consideration. This classification is based on the banknotes in circulation as compiled and presented in Chapter 3 – using the actual amount of Euro banknotes rather than the banknotes in circulation featuring as a liability item on the EANCBs' balance sheet. A description of this adjustment is also summarized in Section 6.3. As the crisis unfolded, more EANCBs were switching to Intra-Eurosystem Borrowers. This reflected the increasing importance of transfers between EA Member States during the crisis period. Subsequently, there was a shift back towards issuing domestic liabilities in 2015 and 2016. Detailed central banks' classifications concerning the liabilities side of the balance sheet are presented in Appendix 6.4.

As explained earlier, an EANCB is classified as issuing predominantly domestic liabilities if, in general terms, reserves exceed Target2 liabilities (assuming that the EANCB has relatively lower banknotes in circulation). The build-up in reserves did not occur uniformly across countries. Particular increases are noted by DE, FR and NL as the increasing possibility of bank runs gave rise to a movement of deposits away from high-debt countries towards countries considered as 'core' of the Euro Area. Meanwhile, the 'periphery' countries like IT, PT, ES and GR held predominantly cross-border positions as they accumulated Target2 liabilities reflecting borrowing by their banks through the Eurosystem. Later, the build-up of

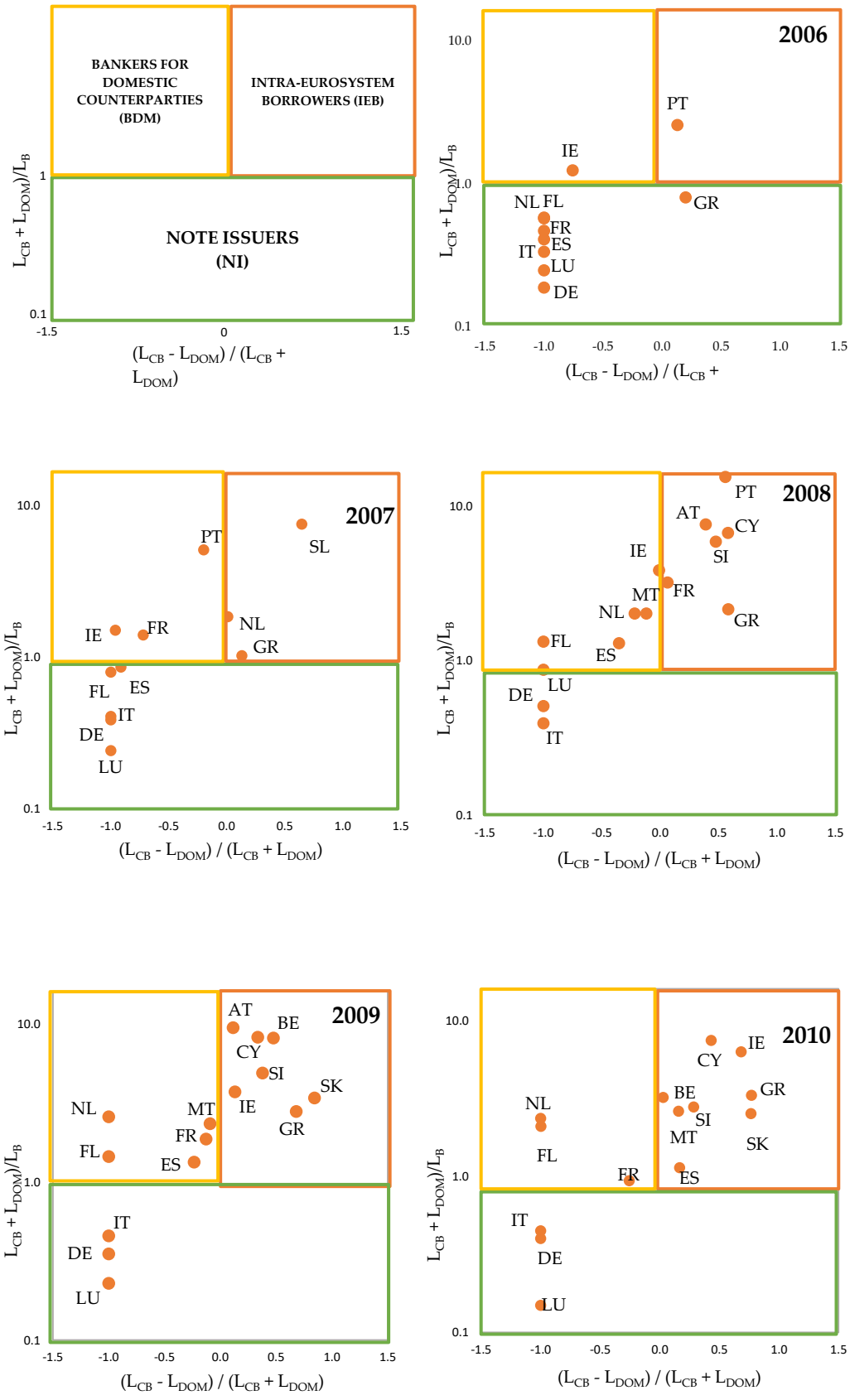
Figure 6.3 Composition of EANCBs' Liabilities by Central Bank - FEANCB



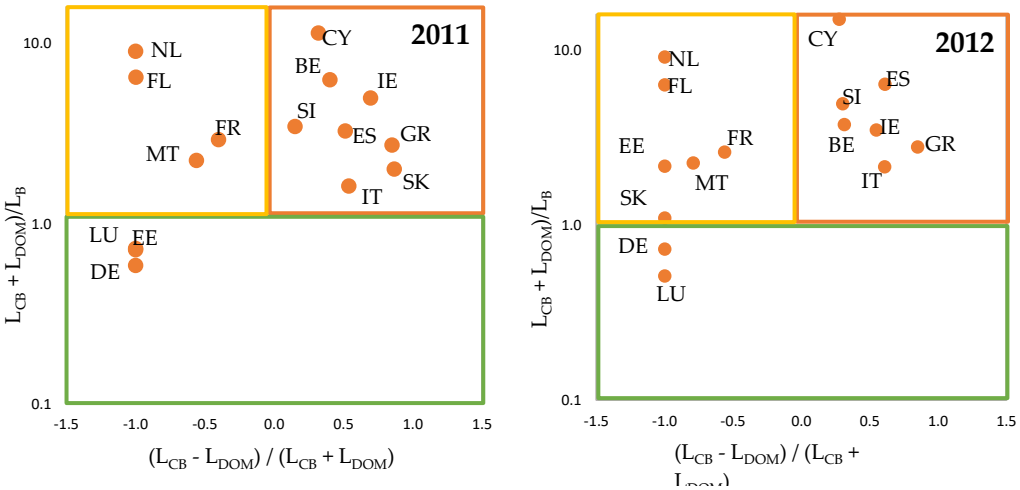
L_B = Banknotes; L_{DOM} = Liabilities to Domestic Counterparties; L_{CB} = Cross-Border Liabilities

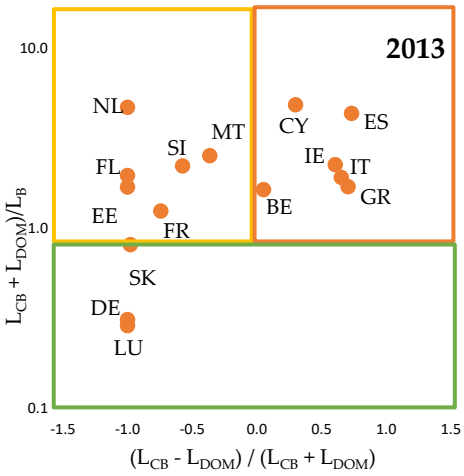
^Data for Portugal for 2011-2016 do not feature here because $(L_{CB}+L_{DOM})/Bn$ is negative. Bn is negative because more banknotes have been taken out of circulation than put into circulation. (Refer to Chapter 3 for a more detailed explanation on the adjustment to banknotes in circulation.)

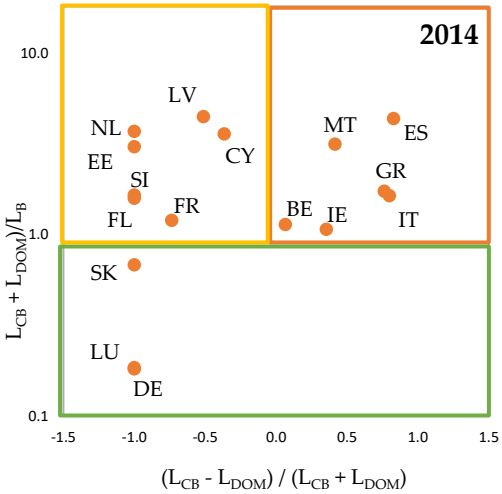
Figure 6.4 Composition of EANCB's Liabilities: 2006-2016 - FEANCB

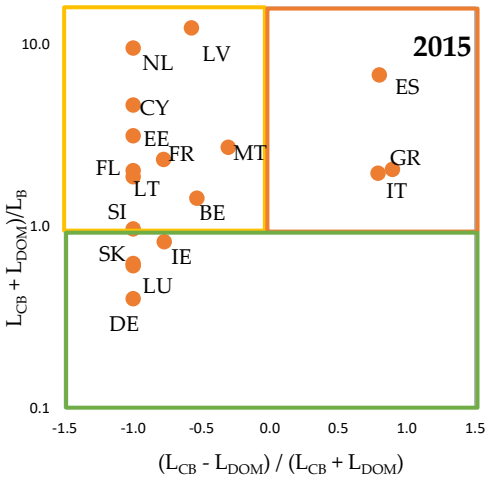


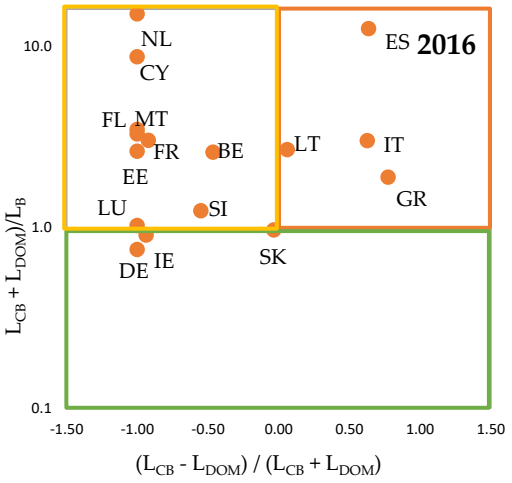
L_B = Banknotes; L_{DOM} = Liabilities to Domestic Counterparties; L_{CB} = Cross-Border Liabilities











L_B = Banknotes; L_{DOM} = Liabilities to Domestic Counterparties; L_{CB} = Cross-Border Liabilities

Target2 liabilities by the 'periphery' countries was also a result of these EANCBs acquiring sovereign bonds from investors outside their own countries requiringcross-border transfers (ECB 2017a). In addition, Whelan (2017) argued that, in the case of Spain and Italy, Target2 liabilities also accumulated as these EANCBs purchased bonds from Spanish and Italian residents, who have then reallocated their money into foreign assets (portfolio rebalancing). These factors are reflected in an eastward shift in the graphs for the 'periphery' countries (Figure 6.3).

To sum up, in terms of the EANCB's balance sheet configuration, this analysis reveals that:

(i) Unsurprisingly, during the recent financial crisis, EANCBs in the 'core' countries engaged more in lending activity and held larger cross-border positions while those in 'peripheral' countries held predominantly domestic assets and were borrowing institutions engaging in larger cross-border liabilities.

(ii) Cross-border activity was more dominant during the years of intense financial crisis.

(iii) As the financial crisis subsided, there was a shift back towards issuing domestic liabilities.

(iv) The rather dramatic changes in the composition of EANCBs' balance sheets is not revealed by the Eurosystem balance sheet.

Further Analysis of the Results – The Framework for Euro Area National Central Banks (FEANCB)

The following summarizes how the main events that unfolded during the crisis affected the composition of EANCBs' balance sheets, clustering them in two main groups: the 'core' and the 'periphery'.

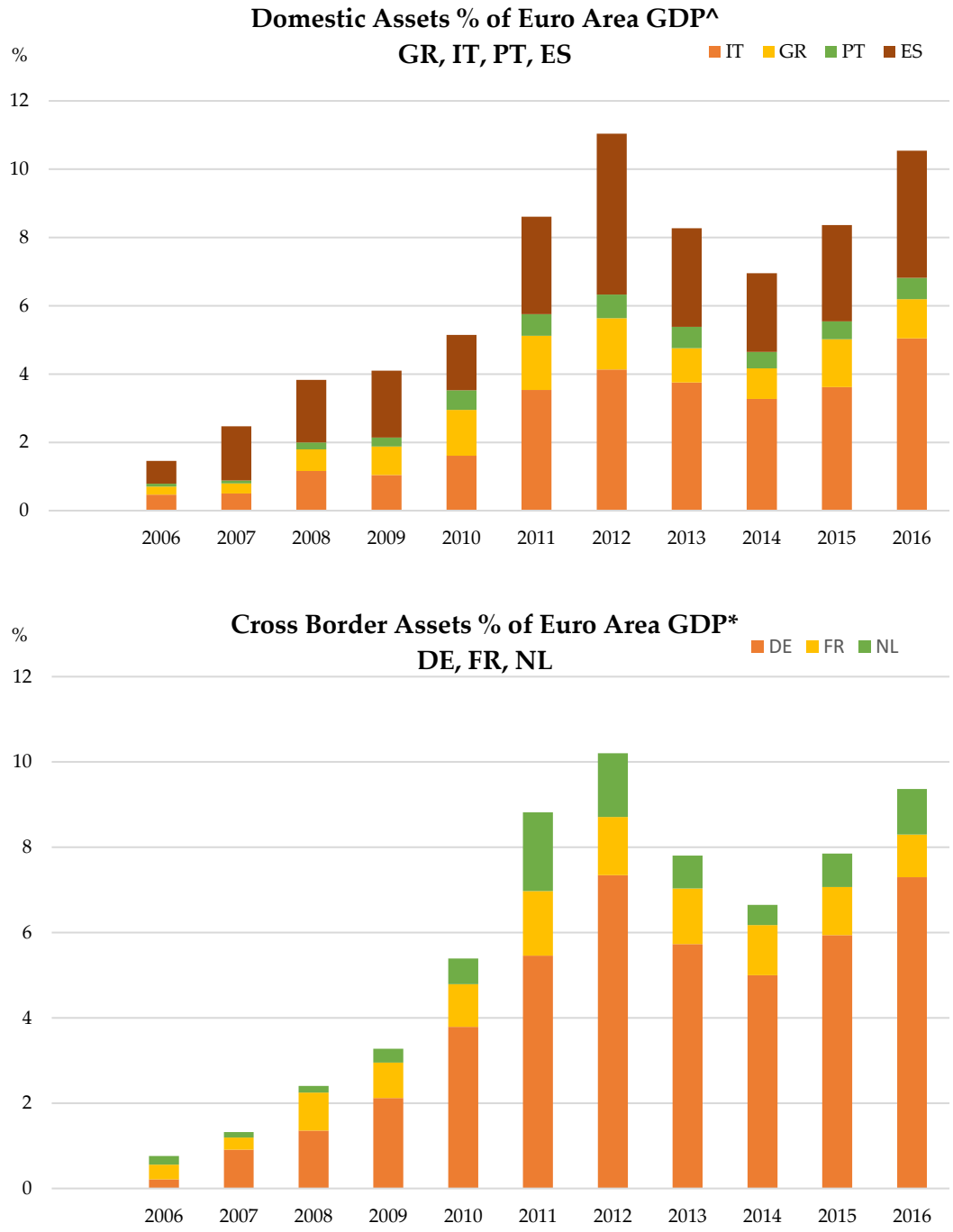
In the early years of the crisis, the loss of funding for banks in countries such as Greece, Italy, Portugal and Spain (GIPS) pushed them to seek replacement funding

from their central banks in a bid to avoid damaging their solvency. This expanded the balance sheet of these EANCBs as they took on new domestic assets in terms of lending to credit institutions. As from 2015, quantitative easing had a similar effect – increasing their domestic assets (upper panel of Figure 6.5). Both of these operations are reflected in increased Target2 liabilities of the GIPS central banks. For example, when Spanish banks experienced deposit flight (to German banks), they increased their lendings from the central bank of Spain. In turn, the central bank of Spain engaged in lending activity to the Spanish banks while also incurring an intra-Eurosystem liabilitiy to the ECB. In the case of QE, as the central bank of Spain purchased Spanish government bonds, it increased its intra-Eurosystem liabilities to the ECB.

In the context of severe market stress, the provision of liquidity via refinancing operations flowed from vulnerable to less-vulnerable countries giving rise to increased reserves (domestic liabilities) in particular on the balance sheets of the central banks of Germany, the Netherlands and France (DNF) and heightened T2 claims as the DNF central banks acquired a claim on the GIPS central banks (cross-border assets – lower panel of Figure 6.5).

The application of the new alternative framework designed for the NCBs operating within the Euro Area reveals that the balance sheet composition differs across national central banks. More interesting is the fact that the balance sheet configuration depends on the ability of the central bank's country to withstand the repercussions of the financial crisis. More specifically, as evident in the previous Figure, EANCBs in the 'core' countries held cross-border asset positions and issued domestic liabilities. Meanwhile, EANCBs in the 'periphery' countries held domestic asset positions and issued cross-border liabilities. This is in line with the accumulation of Target balances– DE accumulated the largest Target claims – classifying as Intra-Eurosystem

Figure 6.5 Domestic and Cross-Border Assets: Periphery vs Core Countries



^Domestic Assets mainly consist of lending to credit institutions and PSPP.
*Cross-Border Assets consist of T2 claims (excluding claims related to euro banknotes).

Lenders while the GIPS built up the largest Target2 liabilities – classifying as Intra-Eurosystem Borrowers. This also confirms that the transfers between EANCBs should be given importance as they may reflect significant activity going on in specific EANCBs.

6.2 The Application of Pattipeilohy's Framework to the EANCBs

Having investigated EANCBs through the newly designed framework (FEANCB) that specifically cater for the three types of transactions EANCBs engage in, it is interesting to look at the same EANCBs from a different perspective. By applying Pattipeilohy's Framework (PF), the different types of domestic assets are put in the limelight even if at the expense of completely ignoring intra-Eurosystem transactions. This is the scope of this second part of this Chapter.

As explained earlier, the Pattipeilohy's Framework was designed for central banks which operate their own monetary policy framework (referred to here as "main" central banks) and therefore transactions either give rise to domestic assets/liabilities in cases when only institutions within the same jurisdiction are involved or give rise to foreign assets/liabilities in case of transaction with other central banks. In a system of central banks such as the Eurosystem, transactions between a national central bank and institutions within the same jurisdiction also involve domestic positions. However, national central banks operating within the system may also be involved with transactions with other EANCBs giving rise to intra cross-border positions. This possibility, which does not rise in case of "main" central banks, necessitated the proposing of a new framework – the FEANCB – which, as dealt with in the previous Section, includes a new category – the intra-Euro Area cross-border assets/liabilities (A_{CB}/L_{CB}).

In light of this, it is easily evident that when applying Pattipeilohy's Framework to the EANCBs, a bold limitation emerges – intra-transactions are not taken into account (this explains why these are marked as Not Applicable in Table 6.3 column 1 and 5). Despite this limitation, however, there is still some validity in the application of PF for EANCBs. As the PF distinguishes between domestic private sector debt and domestic public sector debt on the assets side and between reserves related to the

banking sector and those related to the government on the liabilities side[77], it allows for an investigation into the degree of heterogeneity in the composition of the EANCBs' balance sheets with respect to these categories.

As presented in Table 6.3, the first group of assets, FX, is similar in the two frameworks – with the only difference being the fact that in the FEANCB 'Claims on non-Euro Residents in Euro' are classified as cross-border assets rather than as foreign exchange reserves.

When Pattipeilohy's Framework is applied for the Euro Area central banks, the second group of assets is domestic assets, which is almost equivalent to the domestic assets category in FEANCB. The only discrepancy concerns the ECB's Purchase Programmes as, in line with PF, all Programmes are considered as domestic assets, while in FEANCB (as documented earlier) some are classified as domestic while others are considered as cross-border positions depending on the specific EANCB.

As explained earlier, the motivation to apply PF to EANCBs stems from its ability to distinguish between private and public sector assets. In fact, as defined in Table 6.1, domestic assets are sub-divided into domestic private (L) and domestic public debt (G). Thus, 'Lending to EA Credit Institutions related to Monetary Policy Operations' (item 5) is considered as being private sector debt, while 'Claims on the Federal Government' (item 8) and 'Other Securities' (item 7.2) are considered as public sector debt (G) (refer to Table 6.3).

The Purchase Programmes, which are all considered as domestic assets, are also categorized between L and G. In particular, the Covered Bond Purchase Progamme (CBPP) is considered as domestic private sector debt (L) while the Securities Market Programme (SMP) features as domestic public sector debt (G). Besides the terminated Programmes, the analysis also includes the Asset Purchase Programmes (APP) that

[77] In fact, on the liabilities side, balance sheet items 2 and 3, which according to PF, constitute Rs and item 4.1, which constitute Rg, make up the category L_{DOM} in the prosposed framework.

were introduced at a later point in time and therefore not featuring in Pattipeilohy's 2016 study. In particular, the Corporate Sector Purchase Programme (CSPP), which consisted of the purchase of corporate sector bonds, is included as lending to the domestic private sector (L). In contrast, the Public Sector Purchase Programme (PSPP), as the name entails, involved purchases of public sector securities and is, therefore, classified as domestic public sector lending (G).

While the application of the PF to EANCBs do not treat their balance sheets exhaustively (leaving out one of their main items) it allows for a deeper investigation of domestic assets.

The Asset Side of the EANCBs' Balance Sheets in Pattipeilohy's Framework

As explained earlier, according to the PF, the assets are classified as being either Foreign Exchange Reserves, Domestic Private Sector Debt or Domestic Public Sector Debt. A fourth minor category is 'Other Assets'. The intra-Eurosystem balances are not included in any of these categories of balance sheet items and therefore, the summation of these categories add up to the total Eurosystem assets/liabilities as published by the ECB.

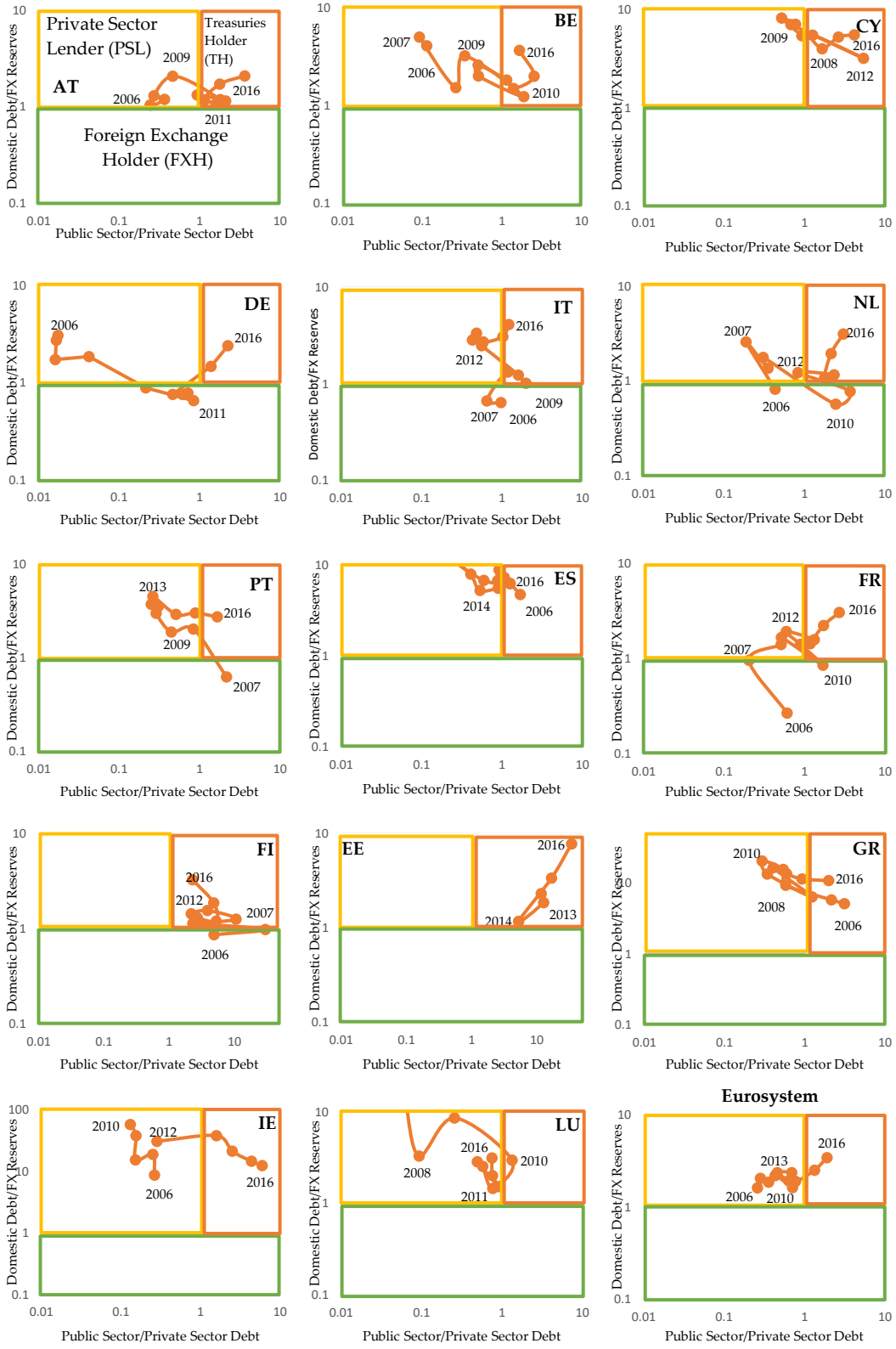
In line with PF, the first indicator on the assets side – (G + L)/FX – characterizes the assets side of the balance sheet as being either predominantly foreign or predominately domestic in nature. This indicator shows the extent to which monetary policy is tuned to the external environment. Moreover, central bank's domestic asset portfolio is characterized as being either geared towards domestic government lending or domestic private lending by computing G/L, indicating the main domestic channel through which the EANCB implements ECB's monetary policy. If a central bank has a larger amount of foreign exchange holdings on its balance sheet compared to its domestic asset holdings (FX > (G + L)), then this central bank is classified as a Foreign Exchange Holder (FXH). On the other hand, if a central bank has more domestic assets relative to foreign exchange reserves, then the central bank is

characterized as a domestic lender – either Treasury Holder (TH) or Private Sector Lender (PSL). If domestic public lending by this central bank exceeds private sector lending (L), then the central bank is a Treasury Holder. In contrast, if the domestic private sector is a counterparty for more than half of the domestic assets, then the central bank is a Private Sector Lender. Intra-Eurosystem balances do not feature in any of these classifications.

Figure 6.6 presents the composition of the EANCBs' assets by central bank based on Pattipeilohy's Framework, which, as explained earlier, does not include intra-Eurosystem balances in the analysis and therefore relates to the ECB definition of total assets. This contrasts with Figure 6.1 which captures the classifications resulting from the FEANCBs and relates to ESTA definition. Moving to the right along the horizontal axis indicates an increasing reliance on domestic public assets (G > L) while shifting to the left indicates a dominance of domestic private sector lending (G< L). Moving upwards along the vertical axis indicates an increasing dominance of domestic assets vis-à-vis foreign assets ((G + L) > FX). Correspondingly, the lower green segment of the charts in Figures 6.6 and 6.7 implies that domestic debt exceeds foreign exchange reserves. The upper left yellow segment implies that private sector debt exceeds public sector debt while the upper right orange segment implies that public sector debt dominates.

A quick look at Figure 6.6 shows that over the 2006-2016 period, the density of the observations in the graphs varied between central banks. In particular, the relative changes in the Bundesbank's balance sheet have been most pronounced, on the basis of the methodology in this study. Indeed, several developments can be observed in terms of asset composition of the Bundesbank. In the 2006 – 2009 period, this central bank maintained a relatively high supply of liquidity to banks, starting out as a Private Sector Lender. Subsequently, in 2010 - 2011, an eastward shift is observed reflecting a fall in lending to credit institutions related to monetary policy coupled with the purchase of securities under the SMP. However, despite the increase in the

Figure 6.6 Composition of EANCBs' Assets excluding Intra-Eurosystem Assets by Central Bank – Pattipeilohy's Framework



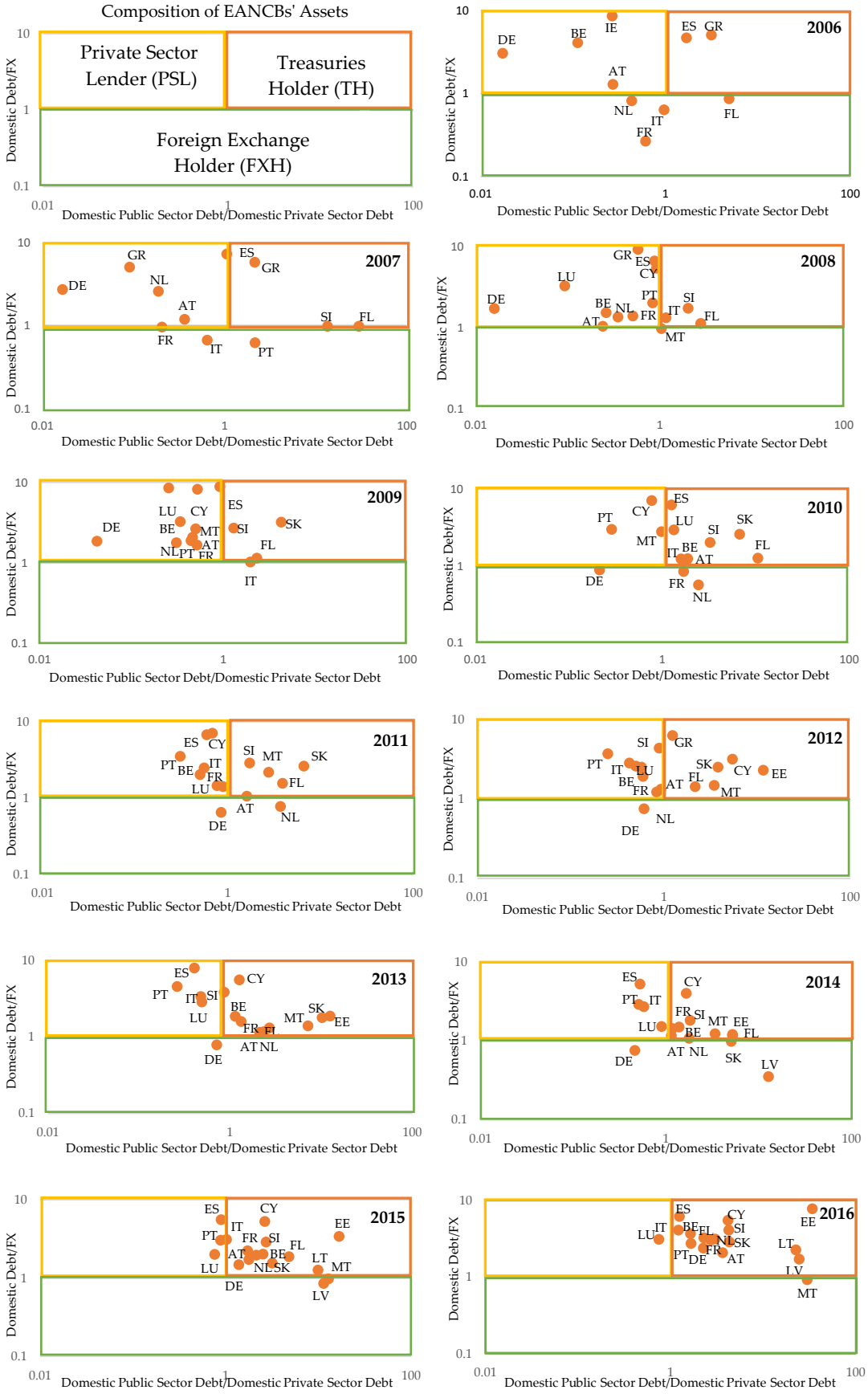
latter, the Bundesbank is classified as an FX-Holder in terms of asset structure. The 2012-2014 was a fairly stable period before a noticeable shift is observed in 2015 and 2016. This shift refers to the participation in the PSPP, which implied a reclassification of the Bundesbank to a Treasuries Holder.

Notable changes in balance sheet composition also occurred for Greece. Starting out as a Treasuries Holder on account of relatively significant claims on the general government, the central bank of Greece steadily increased its supply of liquidity to banks as the crisis unfolded. As a consequence, this central bank became a Private Sector Lender for most of the period under consideration. Over 2010 and 2011, Greece benefited from the Emergency Liquidity Assistance (classified as Other Assets) while lending to banks decreased significantly. As a result, the central bank of Greece's holdings of domestic government bonds exceeded its private sector lending, displayed as a gradual eastward shift becoming again a Treasuries Holder by 2016.

Despite that the relative changes in the balance sheets of the rest of the central banks have been less pronounced, some type-switching is still observed. In particular, in 2011/2012 a westward shift is observed in most cases accept for CY and GR, reflecting the very long-term refinancing operations. On the other hand, an eastward shift is observed in all cases towards the end of the period under consideration, on account of the APP being skewed towards government bonds. Indeed, the central banks which were characterized as being either Private Sector Lenders or Foreign Exchange Folders in 2006 switched to being Treasury Holders by 2016 (with the exception of MT and LU).

As illustrated in Figure 6.7, differences in national central bank asset holdings were more substantial prior to the crisis (2006) than during the years when recovery was underway. In other words, the composition of the asset side of the EANCBs balance sheet was relatively more heterogeneous in 2006 than in the following years to 2016. Indeed, in 2015 and 2016, a high degree of clustering is observed, implying a homogeneous asset structure.

Figure 6.7 Composition of EANCB's Assets excluding Intra-Eurosystem Assets: 2006-2016 - Pattipeilohy's Framework



In 2006, five EANCBs – NL, IT, FR, FL and PT – had their balance sheet assets dominated by foreign exchange reserves rather than domestic assets[78], probably reflecting, to a large extent, the fact that they had managed their own exchange rate and accumulated large amounts of foreign exchange reserves prior to the launch of the monetary union (Nagel, 2012). The remaining seven EANCBs – DE, LU, BE, IE, AT, ES and GR relied more on domestic assets. Out of these EANCBs, the balance sheet of Spain and Greece had higher domestic public sector assets than domestic private sector assets.

During the initial years of the crisis, as a result of the scarcer liquidity, the Eurosystem increased liquidity provision to banks and most EANCBs either sustained the earlier dominance of domestic assets on their balance sheet (primarily private sector assets) or experienced a shift towards this dominance such that by 2009, twelve EANCBs (out of 16) are classified as being Private Sector Lenders (PSL).

Over the following three years to 2012, central banks in most jurisdictions increased their recourse to refinancing operations such that lending to Euro Area credit institutions – both MROs and LTROs – peaked for most EANCBs over the 2010-2012 period. These heightened refinancing operations coupled with the participation of EANCBs in the CBPP were reflected in most EANCBs being classified as PSL at least at one point during these three years. On the other hand, the central banks of Greece and Cyprus registered lower domestic private sector assets as their lending to credit institutions declined while they received Emergency Liquidity Assistance (classified as Other Assets) and were therefore classified as being TH by 2012. As illustrated in Figure 6.7, the years 2010 to 2012 were characterized by considerable type-switching by EANCBs between PSL and TH. At the end of 2012, the EANCBs' relative asset structure still illustrated some degree of heterogeneity (though still lower than the disparity noted in 2006), with ten EANCBs being PSLs, six being THs and only one EANCB considered as a Foreign Exchange Holder.

[78] As explained above intra-Eurosystem assets are not taken into account in the analysis since this is based on a framework which was designed for "main" central banks and therefore does not cater for intra-Eurosystem positions.

As from 2013, the EANCB's asset structures became increasingly homogeneous. Over 2013 and 2014, nine EANCBs (AT, BE, CY, EE, FI, FR, IE, NL and SI) saw their asset structure become more skewed towards domestic public sector assets, as recourse to refinancing operations started decreasing while their take up of SMP increased their holdings of government securities. At the same time, EANCBs such as GR, IT, PT and ES retained their preference towards domestic private sector assets since their high levels of refinancing operations and their participation in the CBPP was stronger than their uptake of securities. Subsequently, in 2015 and 2016, the participation of all the EANCBs in the largest-scale asset programme – the PSPP (amounting to €1.3 billion euros) - implied that by 2016 all EANCBs (except MT and LU) were Treasury Holders.

To sum up, in terms of asset composition[79], this analysis reveals that:

a) In general, dissimilarity in asset composition appears large among EANCBs particularly up to 2012.
b) Since 2013, the composition of the asset side of the EANCBs' balance sheets became less diverse and by 2016, a high degree of homogeneity is observed in the asset structure of the EANCBs balance sheet – all EANCBs[80] were classified as Treasury Holders.
c) Almost all EANCBs[81] have domestic asset holdings equal to or larger than foreign asset holdings and are thus classified as either Private Sector Lender or Treasuries Holder.
d) The most significant changes occurred in the balance sheet configuration of the Bundesbank, which started out in 2006, holding almost solely domestic private sector assets (vis-à-vis public sector assets) and some dominance of foreign exchange reserves in the midst of the crisis but having the asset side of the balance sheet highly dominated by domestic public assets in 2015 and 2016.
e) In terms of typology, a considerable number of EANCBs switched type over the period under analysis. Quantitative easing had a significant impact on

[79] Refer to Appendix 6.5 for detailed classification results.
[80] Luxembourg and Malta are excluded from the analysis since they are either outliers or insignificant.
[81] Main exceptions are Germany (2010 – 2014) and Netherlands (2010 -2011);

EANCBs balance sheet composition. Since this was skewed towards government bonds, almost all of the EANCBs have become Treasury Holders by 2016.

When applying Pattipeilohy's Framework to the balance sheet of the Eurosystem as published by the ECB, one notes that the Eurosystem is classified as a PSL for nine consecutive years up to 2014, switching type in 2015 to being a Treasuries Holder. This contrasts with the significant type-switching observed in terms of asset composition of individual EANCBs. Up to 2014, while some EANCBs such as AT, BE, CY, FR, IE and NL increased their holdings of government securities, the engagement of other EANCBs such as GR, IT, PT and ES in longer-term refinancing operations dominated leading to the amalgamated balance sheet being classified as a PSL. Subsequently, in 2015, domestic public sector assets acquired by all EANCBs under the SMP and the PSPP (accounting for 22 per cent and 37 per cent of the total Eurosystem assets respectively) dominated, classifying the Eurosystem's balance sheet (in line with the classification for all EANCBs) as Treasuries Holders. In light of these results, it is easy to conclude that the rather dramatic changes in the EANCBs balance sheet composition are hidden in the Eurosystem balance sheet, particularly for the period when the effects of the financial crisis were intense and the ECB was doing 'whatever it takes' to ameliorate hard hit Eurozone financial sectors and economies. This point had already emerged when applying the FEANCB – one cannot identify the changes in the EANCBs' balance sheets composition by simply looking at the Eurosystem balance sheet.

These results are unchanged when the Eurosystem is defined according to the definition presented in Chapter 4 – ESTA – since, as explained earlier, this framework do not account for intra-Eurosystem transactions. Again, this is one of the main motivations of proposing the FEANCB, which accounts for intra-transactions.

The Liabilities Side of the EANCBs Balance Sheets in Pattipeilohy's Framework

On the liabilities side, the PF compares the category banknotes in circulation (Bn) to non-banknote liabilities, the latter consisting of liabilities to the banking sector (Rs) and liabilities to government (Rg), by constructing the indicator ((Rs + Rg)/Bn). The ratio Rg/Rs is also computed to distinguish between deposit liabilities begin geared towards the banking sector from those geared towards the domestic government. As explained earlier, any liability position held between central banks is not taken into account in PF.

An eastward shift along the horizontal axis of the charts in Figure 6.8 and 6.9 implies an increase in liabilities to the banking sector as compared to the liabilities to the government (Rs>Rg). An upward shift along the vertical axis refers to an increasing dominance in the balance sheet of non-banknote liabilities as compared to banknotes in circulation (Rs + Rg)>Bn.

Figure 6.8 illustrates developments in the balance sheet configuration of each EANCB over the 2006-2016 period. The density of the observations in the graphs varies between central banks – BE, CY, IE and IT experiencing limited changes in composition while DE, FR, GR and ES registering more pronounced shifts. As the Germans remain obsessed with cash (Weidmann, 2016), the Bundesbank was classified as a Note Issuer throughout the entire period under review, despite a comeback in deposits associated with the banking sector in 2015 and 2016 (reflected in horizontal shifts on the graph). Greece has also been classified as a Note Issuer, however, for different reasons – total deposits have been relatively low from the start, weakening even further in later years as deposit flight from the EA 'periphery' banking systems became more relevant, implying south-western shifts on the graph.

Figure 6.9 clearly illustrates that differences amongst EANCBs in the composition of their liabilities remain substantial throughout the entire period. This contrasts with

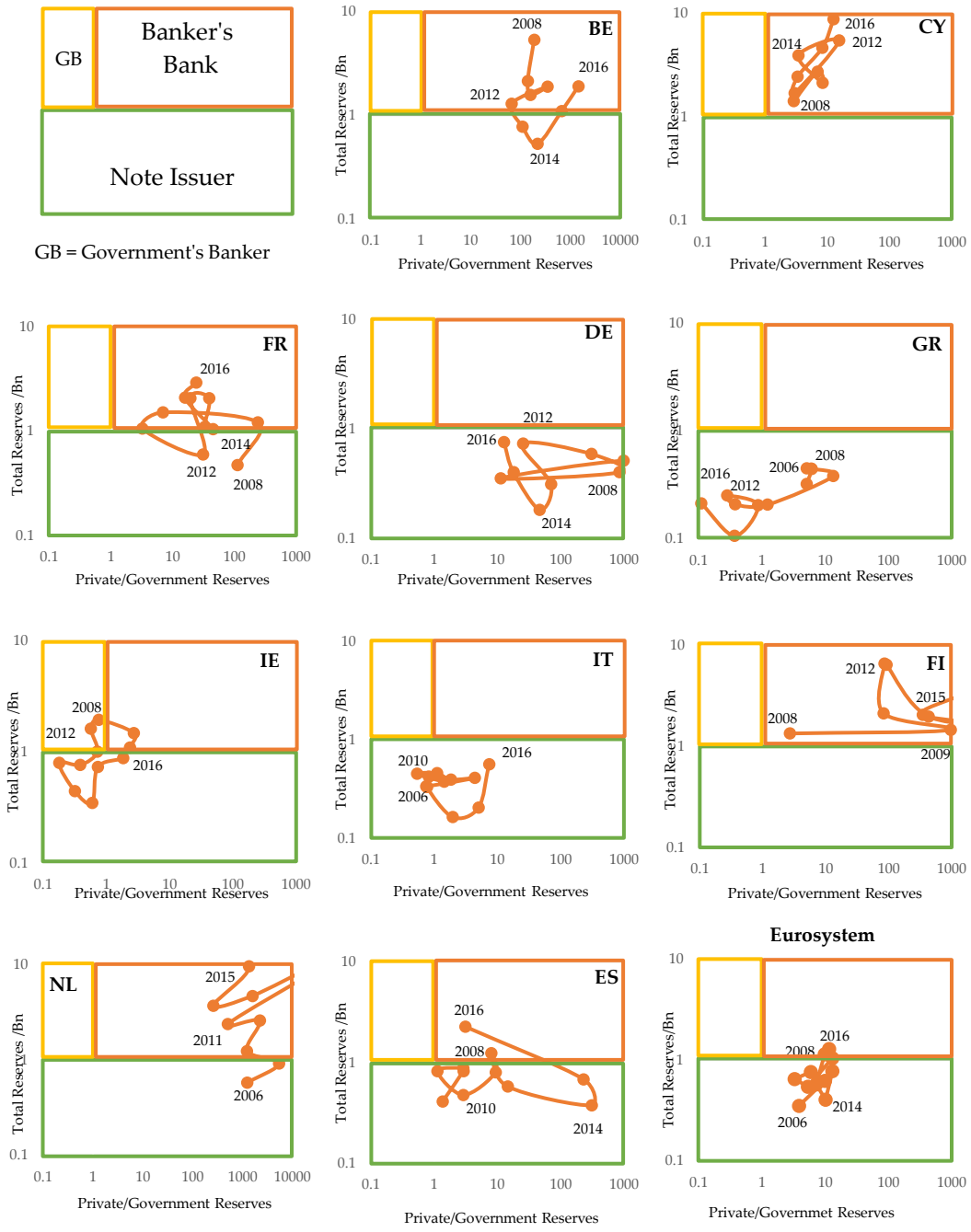
the asset side of the balance sheet discussed earlier. In the context of Pattipeilohy's Framework, EANCBs are more heterogeneous in terms of liability composition.

It is pertinent to note that, the relatively high degree of heterogeneity between the structures of the liabilities side of the EANCBs' balance sheets does not always translate into different classifications of EANCBs. In fact, while large disparity between EANCBs exist, most EANCBs still fall within the same classification. For this reason, although looking at the classification of each EANCB for each year under review (as presented in Appendix 6.6) gives the impression of a relatively high homogeneity between EANCBs, Figures 6.8 and 6.9 illustrate otherwise.

In 2006, the majority of EANCBs were classified as Note Issuers reflecting relatively high banknotes in circulation and low bank reserves (very limited excess reserves beyond the regulatory requirement). Thus, according to Nagel (2012), these EANCBs had a 'lean' balance sheet prior to the crisis. Only AT, BE, IE and PT were classified as Banker's Bank reflecting relatively low banknotes in circulation (AT and BE) or an almost equal distribution between banknotes and reserves (IE and PT).

Besides the four EANCBs which started out as Banker's Banks in 2006, as the crisis unfolded, three other EANCBs (FI, FR, NL) switched type gradually to being a Banker's Bank as bank demand for central bank liquidity increased during the sovereign debt crisis. The other EANCBs which joined the Euro Area after 2006 (CY, EE, MT and SI) were classified as Banker's Banks for almost the entire period (with the exception of Slovakia, which was classified as a Note Issuer). The large levels of excess liquidity provided via the ECB's non-standard measures such as the LTROs had a corresponding effect on the liabilities of central banks, as the recourse to the deposit facility by credit institutions has also increased significantly. Thus, by 2016, twelve (out of nineteen) EANCBs were classified as being Banker's Banks, also triggered by the large scale purchases of financial securities (through the APP)

Figure 6.8 Composition of EANCBs' Liabilities excluding Intra-Eurosystem Liabilities by Central Bank – Pattipeilohy's Framework



which led to an expansion of excess bank reserves. Meanwhile, seven EANCBs remained Note Issuers for all or most of the period under review.

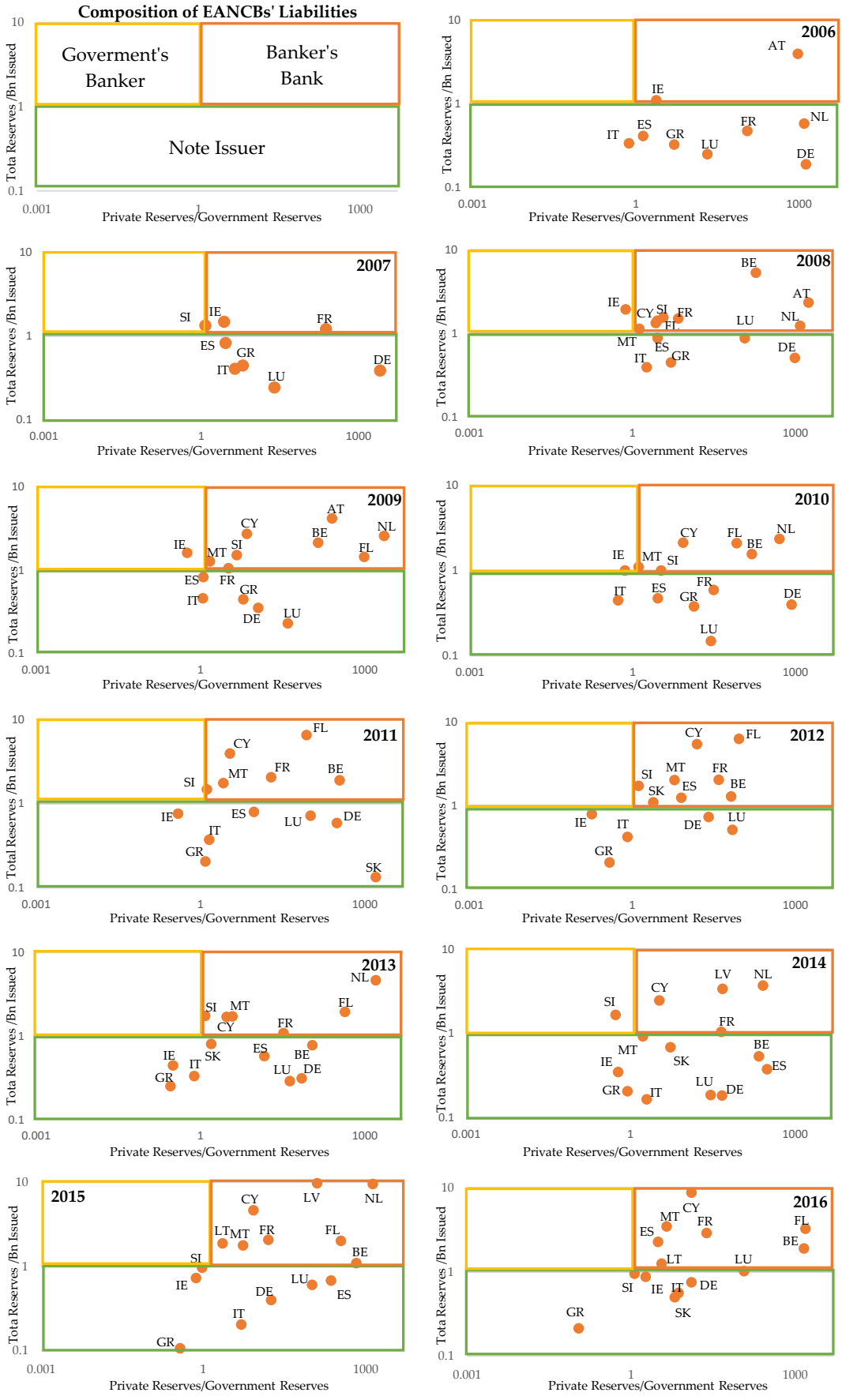
Only the central bank of Portugal switched type to being Government's Bank in 2016 relating to deposits from the Portuguese Treasury and Government Debt Agency with reference to the European Financial Stabilisation Mechanism and the European Financial Stabilisation Facility.

To sum up, in terms of the composition of EANCBs' liabilities (refer to Appendix 6.6 for detailed classification results), this study reveals that:

a) EANCBs are more heterogeneous in terms of liability composition and remain so even when the effects of the financial crisis subsided.
b) Despite that a higher degree of heterogeneity is observed amongst EANCBs, most EANCBs fall within the same classification - Bankers Bank - by 2016.
c) 'Periphery' countries like GR, IT, ES and IE were classified as Note Issuers during the financial crisis period with relatively low recourse to the deposit facility and minimum reserves coupled with low government deposits. Germany was also classified as Note Issuer, which unsurprisingly, reflects high demand for banknotes.
d) Type-switching was relatively low amongst EANCBs despite disparity in their balance sheet composition.

Again, the heterogeneity observed amongst EANCBs in their balance sheet classification is not revealed by the Eurosystem balance sheet. In particular, the type-switching towards being a Banker's Bank is only evident in 2011 and 2012 by the Eurosystem balance sheet. Similar to what was observed in the case of the composition on the assets side of the balance sheet, looking at the Eurosystem balance sheet is not enough for a proper analysis of what goes on amongst the individual EANCBs – indeed EANCBs balance sheets do matter.

Figure 6.9 Composition of EANCB's Liabilities excluding Intra-Eurosystem Liabilities: 2006-2016 - Pattipeilohy's Framework



Despite that this analysis revealed interesting insights on the EANCBs, it is pertinent to emphasize again that applying Pattipeilohy's Framework to the EANCBs have one important limitation - the balance sheets of the EANCBs are not treated exhaustively. In fact, transactions between EANCBs giving rise to intra-Eurosystem transactions are ignored in this analysis, thus accounting for only around 70 per cent of the total balance sheet (as defined by ESTA).

6.3 Data Description

The analysis presented in this Chapter requires more detailed data than the unique basic dataset described in Chapter 3. To this end, the basic dataset is enriched through the consideration of specific sub-items of the balance sheet for each EANCB. Data for these sub-items feature in Appendix 6.8.

The investigation of observed compositional changes in the EANCBs' balance sheets in this Chapter makes use of additional data pertaining to the following specific balance sheet sub-items:

i) Covered Bond Purchase Programme
ii) Corporate Sector Purchase Programme
iii) Securities Market Programme
iv) Public Sector Purchase Programme
v) Liabilities to other Euro Area residents denominated in Euro pertaining to General Government (Item 4.1).

As mentioned earlier, the Asset Purchase Programmes (items i – iv above) involved the purchase of both domestic and cross-border securities. Thus, data on each Programme were required in order to classify them accordingly. Such data were collected from the Annual Reports of the specific EANCBs, where they were either presented as sub-items in the balance sheets or in the notes to the accounts in their Annual Reports. Similarly to the basic dataset, this specific data were collected on an annual frequency for the 2006-2016 period.

Through a quick look at Table 6.3 above, one notices that according to FEANCB the sub-item 4.1 is classified as domestic liabilties while sub-item 4.2 is included under the category 'other liabilities' and therefore it was necessary to collect data for each of these sub-components. Similarly to the data concerning the APPs, these data were accessed either from the EANCBs balance sheets or from the notes to the accounts in their Annual Reports.

In the process of transporting EANCBs standardized data on their balance sheets as published in their Annual Reports to Table 6.3, one specific calculation concerning banknotes in circulation was necessary. As documented earlier in Chapter 3, the actual amount of banknotes in circulation was calculated by subtracting/adding up the amount of banknotes in circulation reported in the balance sheet of the EANCB (item 1 on the liabilities side) and the intra-Eurosystem claim/liabilities pertaining to the allocation of Euro banknotes (item 9.3 on the assets side or item 9.2 on the liabilities side). If a EANCB records a net intra-Eurosystem claim related to the allocation of Euro banknotes (on the asset side of the balance sheet), it implies that this EANCB puts less banknotes into circulation then the amount allocated to it (through the banknote allocation key). Thus, this intra-Eurosystem claim is deducted from the allocated banknotes in circulation (recorded as item 1 on the liabilities side). In such cases[82], the total assets/liabilites on the balance sheet are therefore recalculated, leading to a smaller balance sheet. In fact, the total assets/liabilities of some EANCBs presented in the dataset in the Appendix to Chapter 3 differ from the totals presented in Appendix 6.7, 6.8 and 6.9.

For example, the total liabilities for 2016 for France amounted to €845.3 billion. Of this total, €208.7 billion pertain to the allocation of banknotes in circulation (item 1 on the liabilties side). However, France issued fewer banknotes than that and recorded claims related to the allocation of Euro banknotes amounting to €88.9 billion. Thus,

[82] This was the case for the following EANCBs throughout the 2006-2016 period: AT, BE, EE, FI, FR, LT, LV, NL, PT, SK and SI. Other EANCBs such as CY, IT and ES recorded intra-Eurosystem claims related to the allocation of Euro banknotes for only part of this period while DE, IE, GR, MT and LU recorded intra-Eurosystem liabilities related to Euro banknotes and therefore their total assets/liabilities remained unchanged.

the latter amount was deducted from the former and the amount of banknotes in circulation featuring on the liabilities side of the balance sheet was revised downwards to €119.8 billion. Consequently, the total assets/liabilities were revised downwards to €756.4 billion.

6.3.1 Caveats

A number of caveats concerning this methodology are noteworthy. Firstly, transposing the actual EANCBs' balance sheets (consisting of a total of 45 components and sub-components) into simplified stylized balance sheets as in Table 6.3 is not always clear.

For example, while in his study, Pattipeilohy included 'Other assets' under the foreign exchange reserves category, it is considered as a separate category in FEANCB. Moreover, Pattipeilohy's study takes a number of other assumptions in classifying balance sheet items into the different categories. In particular, despite that the SMP was designed as a purchase programme of public and private securities, it is categorized as being entirely domestic public debt with the central bank. Furthermore, the balance sheet item 'Securities of euro-area residents denominated in euro', other than the CBPP and CSPP, is assumed to entirely involve public sector lending. These assumptions may, in particular instances, seriously modify the classification of the EANCBs.

As noted earlier, this methodological approach accounts for only monetary policy measures that affect the size of the balance sheets. Other measures of a regulatory nature, such as the non-standard measures adopted in the early phase of the financial crisis by the ECB, including the extended range of accepted collateral in the credit operations and the increased range of counterparties, are not captured by this approach, despite that these may affect the quality of the assets.

This indicator-based methodology is subject to a number of somewhat arbitrary classification rules. In particular, the classification rules concerning the liabilities side applied in the analysis in this Chapter are slightly modified from those in Pattipeilohy's study (refer to Appendix Table 6.1.1). However, such a modification exerts a minimal effect on the classification of the EANCBs.

Other caveats concern the interpretation of the indicator-based classification scheme. A central bank is classified on the basis of quantitative rules (as in Appendix Table 6.1.1 and Table 6.1.2). Thus, if for example foreign exchange reserves exceed domestic assets by one Euro than that central bank is considered as a Foreign Exchange Holder. On the other hand, if foreign exchange reserves are one Euro less than domestic assets, then that central bank is classified as either a Treasury Holder or a Private Sector Lender, again determined by which of these is the greater. These numerical rules are set arbitrary and may significantly affect the characterization of the EANCBs. Moreover, according to these classification schemes, EANCBs may exhibit characteristics of a particular type to different degrees. For example, a central bank may be classified as a Foreign Exchange Holder if its foreign reserves exceed domestic assets by a margin. However, a central bank whose foreign reserves exceed domestic assets significantly is also classified as a Foreign Exchange Holder. This methodology does not allow for distinguishing between these two EANCBs. As a result, the classification schemes should be interpreted with caution. However, as touched upon earlier, despite this limitation emerging from the use of classification rules, the charts that accompany this analysis, serve to, at least to some extent, address this issue by graphically showing the gap between EANCBs with the same classification.

Despite these caveats, the application of these two frameworks for the EANCBs, as already discussed, uncover interesting insights on the balance sheets of the EANCBs beyond what can be observed from looking only at size-metrics.

6.4 Concluding Remarks

Since the outbreak of the financial crisis, the Eurosystem adopted a number of non-standard monetary policy measures that had an impact on the individual EANCBs' balance sheets. The increased lending to Euro Area credit institutions in the early years of the crisis and the large-scale asset purchases conducted from 2015 onwards all led to significant effects on the EANCBs' balance sheets. However, these effects were not necessarily the same. While the latter increased the size of the balance sheet, this was not the case for the former, rendering the size and the composition of asset holdings equally important for a comprehensive analysis of the central bank balance sheet.

In contrast with balance sheet analysis for the business community, central bank balance sheet analysis is still in its infancy. A framework for analyzing central bank balance sheets has only been recently developed by Pattipeilohy (2016) to study "main" central banks in both advanced and emerging market economies. Similar to this framework, a new proposed framework is designed to take into account transactions that occur between central banks operating within a system such as the Eurosystem. This is the main contribution of this Chapter.

As a number of EANCBs had their balance sheets predominantly characterized by cross-border positions, particularly during the years of intense financial crisis, the proposed framework – FEANCB – segments the assets and liabilities into three main groups distinguishing between foreign exchange reserves, domestic assets and intra-Eurosystem claims on the assets side and banknotes, reserves and intra-Eurosystem liabilities on the liabilities side. Based on the construction of a set of balance sheet ratios and classification rules, each EANCB was classified as either Foreign Exchange Holder, Domestic Assets Holder or Intra-Eurosystem Lender on the assets side and Note Issuer, Banker for Domestic Counterparties and Intra-Eurosystem Borrower in terms of liabilities.

A number of interesting insights emerged with regard to the EANCBs' balance sheets configuration. In particular, this Chapter revealed that EANCBs in countries whose financial sectors were in distress during the financial crisis provided liquidity to institutions in their own jurisdiction not only through normal monetary policy operations but also through their participation in the APP by buying securities issued by institutions residing in their own EA Member State. This is evident from their holdings of domestic assets. In supporting their banking sector, these EANCBs engaged in increased Target2 liabilities. On the other hand, EANCBs who could withstand the crisis and supported other EANCBs, experienced heightened reserves as deposits moved away from high-debt countries and, in turn, increased their Target2 assets.

These compositional changes in the EANCBs' balance sheets have been at least somewhat predictable; during the financial crisis EANCBs in the 'core' countries engaged more in lending activity and held larger cross-border asset positions; EANCBs in 'peripheral' countries held predominantly domestic assets and were borrowing institutions engaging in cross-border liabilities.

Although this analysis does not cover a long period of time prior to the crisis but starts from 2006 or from the year of Euro adoption, one can easily deduce that there is some element of path-dependence affecting the composition of the balance sheets. For example, the pre-Euro history of Latvia, whose de facto monetary policy closely resembled a currency board – though formally the weakest arrangement among the Baltics – left its impact on its balance sheet composition post Euro adoption, being the only central bank classified as a foreign exchange holder in 2014.

It has also been observed that the rather dramatic changes in the EANCBs' balance sheet composition are hidden in the consolidated Eurosystem balance sheet validating the focus of this thesis on the EANCBs' balance sheets.

Some validity was also identified in applying Pattipeilohy's Framework to the EANCBs, notably stemming from the fact that this framework allows for particular focus on domestic assets distinguishing between those related to government and those related to the private sector. On the liabilities side, PF also allows for distinguishing whether central bank's deposit liabilities are geared more towards the banking sector or the domestic government.

Applying the Pattipeilohy's Framework to the nineteen central banks reveals that in terms of typology, a considerable number of EANCBs switched type over the period under analysis, becoming Treasury Holders by 2016, as quantitative easing was skewed towards government bonds. While a significant degree of homogeneity was observed across EANCBs in terms of assets composition, EANCBs are more heterogeneous in terms of liability composition. As in the case of FEANCB, the Eurosystem balance sheet did not expose the changes in the composition of the EANCB's balance sheets that occurred during the financial crisis.

Chapter 7

Concluding Remarks

Taking up the topic of the central bank balance sheets may sound arcane but as their unconventional use as a monetary policy tool became an increasingly common convention in the art of central banking, it was immediately recognized that more attention should be paid to central bank balance sheets than was the case prior to the crisis. The unprecedented scale and persistence of their worldwide expansion called for special attention. Indeed, recently there has been significant contribution in the literature on the understanding of the difficult and controversial issues related to the balance sheets of central banks now facing the central banking community.

This thesis was motivated by the emergence of this new field of monetary policy analysis – the analysis of central banks' balance sheets. However, despite that this field was rapidly gaining ground, analysis of balance sheets of national central banks operating within a system of central banks still received very little attention and the implications of such an analysis remained highly neglected. This is the niche to which this thesis contributes.

Focusing specifically on the Eurosystem, this thesis contributes through the collection of a dataset as well as through investigations of the balance sheets of the Euro Area National Central Banks, which in turn, lead to revealing insights on what was actually happening inside the Eurosystem – insights which remain unknown if one merely looks at the Eurosystem as a whole. On the basis of the dataset which contains a wealth of information on the national central banks of the Euro Area, a number of

questions are answered while others remain to be addressed through further research.

Firstly, this thesis presents an alternative measure of the Eurosystem that serves to facilitate the investigation on the relationship between the national central banks within the Euro Area, the ECB and the Eurosystem. This new measure (ESTA), which is significantly larger than that published by the ECB, however, points towards a paradox – if evidence leads to advocating that most EANCBs act on autopilot, then their behaviour can be considered similar to branches of a greater entity. But, being branches of a greater entity allows for consolidation, thus, challenging the premise that the central institution of the Eurosystem is greater than the ECB. Though this paradox remain unresolved, this thesis presents evidence that the EANCBs are indeed effectively branches of a greater entity. In particular, it has been established that the size of the EANCBs' balance sheets are, at least to some extent, determined by the size of their share in the ECB capital and this relationship is even stronger when the alternative definition of the Eurosystem is followed. The distinctive power of the ECB over the EANCBs has also been detected in terms of their financial strength as well as regarding their participation in the purchase programmes launched by the ECB in response to the crisis. A comparison with the Federal Reserve System also reveals weaker autonomy between the EANCBs and the ECB. In relation to these issues, this thesis concludes that the systematic behaviour of EANCBs is being disguised by the way the balance sheet of the Eurosystem is being published by the ECB. Moreover, the importance of publishing the EANCBs' balance sheets on a higher frequency has also been brought to the forefront. It has been made clear that monthly or quarterly data provide further information than annual data, the latter obscuring important developments at times. Thus, it is recommended that all EANCBs are committed to publish their balance sheets on a monthly or at least quarterly basis.

Further investigation on this matter revealed that the rise of ESTA above the ECB published balance sheet was caused by T2 borrowing which was vital in view of a

lack of an overall official lender of last resort for peripheral countries whose borrowing needs were heightened during the financial crisis and accentuated by an increase in spreads. It was also revealed that as T2 borrowings needed to be matched by T2 lending, this counterpart lending occurred through an auto-pilot mechanism whereby countries simply had to take their share of lending according to a rule identified in this thesis but never officially announced. As noted earlier, evidence was found of a systematic behaviour by the "Mega-ECB" operating by treating the EANCBs as branches that needed to satisfy the aggregate need for lending generated by the distressed countries. This thesis has identified lending via an auto-pilot mechanism while the casual factor for the balance sheet expansion was effectively the borrowing driven by the needs of the distressed governments. This remains unrevealed if the Eurosystem balance sheet is defined as the consolidated EANCBs balance sheets.

Having discussed the alternative measure of the Eurosystem balance sheet (ESTA), the drivers of expansions in ESTA as compared to growth in the Eurosystem balance sheet as published by the ECB were examined. Overall, the rise of ESTA over the Eurosystem balance sheet published by the ECB was triggered by sufficiently alarming spikes in Greek and other sovereign debt spreads. Moreover, despite some exceptions with respect to Greece and Ireland, overall, country-specific financial tension in the sovereign debt market triggered the massive accumulation of T2 imbalances and hence the expansion in the Eurosystem balance sheet.

The relationships identified between the EANCBs, the ECB and the Eurosystem are also confirmed through an econometric analysis that estimated models determining the rate at which EANCBs adjust their size to the level that reflect their share in the ECB. It has been found that a one per cent increase in Implied Total Assets causes a one per cent increase in the Actual Total Assets. Moreover, over the long-run Actual Total Assets tend to move towards equilibrium. Amongst the ten models estimated, the preferred model has homogenous coefficients, unit short and long-run coefficients on Implied Total Assets and partial adjustment to the long-run

equilibrium. It has been shown that this preferred model fits better when the intra-Eurosystem transactions are not consolidated.

This thesis also conducts a detailed comparative analysis of developments in both the size and the composition of the balance sheets of the EANCBs. This analysis builds upon a unified framework presented by Pattipeilohy (2016) in his analysis of developments in central banks' balance sheet composition. Since this framework was designed for "main" central banks and therefore does not include intra-transactions between central banks operating within a system, this thesis proposed a new framework through which the position of each EANCB vis-à-vis the rest of the national central banks could be examined. The application of this proposed framework revealed interesting insights concerning the central bank balance sheets configuration. Unsurprisingly, during the recent financial crisis, EANCBs in the core countries engaged more in lending activity and held larger cross-border positions while those in 'peripheral' countries held predominantly domestic assets and were borrowing institutions engaging in larger cross-border liabilities, in line with the accumulation of Target balances.

Some validity was recognised in applying Pattipeilohy's Framework to the EANCBs despite that these balance sheets are not treated exhaustively. This has revealed other interesting insights focusing particularly on the domestic part of the balance sheet. Starting with a relatively high degree of heterogeneity in the composition of the asset side of the EANCBs balance sheet up to 2012, all EANCBs were classified as holding mostly domestic government assets by 2016. The composition of the EANCBs' balance sheets was more heterogeneous in terms of liability composition. Under both frameworks, it has also been observed that the rather dramatic changes in the EANCBs' balance sheet composition are not revealed through the Eurosystem balance sheet in aggregate. This provides another justification as to why the EANCBs' balance sheets matter.

The literature (or rather lack of it) treats the Euro Area national central banks as if they do not matter. This thesis attempts to rectify this and demonstrates, in various ways, that they do matter. In sum, EANCBs balance sheets matter because they have the power to reveal facts that are obscured in the aggregate Eurosystem balance sheet – facts that may have important implications for individual national central banks as well as for the Eurosystem as a whole.

While demonstrating the validity of Euro Area National Central Banks' balance sheets, the analysis carried out in this thesis identified further gaps and posed new questions calling for future research. This may be facilitated by the use of the dataset contributed in this thesis.

Having reached the conclusion that, to a large extent, the ECB's capital is powerful enough to determine the financial strength of each EANCB poses a further question on which no consensus has, as yet, been reached in the literature. What determines the optimal level of central bank capital? And, in the context of this thesis, what is the optimal level of capital of each EANCB? In Chapter 4, the levels of capital (and reserves, revaluation accounts and provisions) of each EANCB were compared with the level of capital implied by their share in the ECB's capital. But, while this focused on the distribution of the capital amongst EANCBs, the designing of a formula that determines the optimum level of capital for each EANCB is left for future research.

Another interesting investigation which is left for future research, is to apply a slightly modified methodology in conducting the comparison between the systematic relationship identified between the EANCBs and the ECB and that between the FRB and the Federal Reserve System. In particular, the size of the EANCBs balance sheet is compared with the proportion of total capital that is held by each EANCB on its balance sheet rather than its share of the ECB's capital. This would provide for a more accurate comparison despite that, as discussed in Chapter 4, the result is not expected to be materially different.

Further research is also needed in the area concerning the typology of central banks. In Chapter 6, the starting point of the analysis on the composition of the balance sheets of national central banks was either 2006 (taken to represent a point in time prior to the crisis) or the date of adoption of the Euro in case of central banks that joined the Eurosystem after 2006. Given that prior to adopting the Euro, national central banks had divergent structures and central bank traditions, it would be interesting to go back in time and start the analysis from an earlier point in time. It is intriguing to determine the characteristics of the central banks prior to joining the Eurosystem and identify the extent to which they evolved from their pre-Euro positions.

There is growing evidence of significant diminishing returns from asset purchases in both the UK and the US. Similarly, other studies concluded that lowering short-term interest rates and compressing credit spreads further from already-low levels are likely to produce diminishing economic benefits in the Euro Area. Against this background and in the context of the issues investigated in this thesis, it would be interesting to further examine whether surprise changes in the EANCBs balance sheets matter more than predicted ones.

One peculiar facet closely related to the observed changes in the size and composition of central banks' balance sheets (Chapter 6) is the evolution of central bank profits in the aftermath of the global financial crisis. It is interesting to investigate how the non-standard monetary policy measures impacted on the profits of EANCBs. For example, as documented by Bibow (2018), the fact that the ECB embarked on quantitative easing only at a very late stage led to the absence of a significant boost in its seigniorage profits. As this juncture, it is interesting to question whether this would have been different if the Bundesbank did not engage in cross-border activities but matched its domestic liabilities with German debt. This investigation applied for the EANCBs is another direction for further inquiry.

APPENDICES

Appendices to Chapter 3

Appendix 3.1: The Complete Dataset: 2006-2016

Table I: The Balance Sheet of the National Central Bank of Austria

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	4,481	5,115	5,595	6,899	9,501	10,954	11,353	7,843	8,892	8,761	9,885
Claims on non-Euro Residents in Foreign Currency (FC)	A2	5,204	7,192	6,342	5,597	7,147	8,446	9,216	8,963	11,607	11,637	12,210
Receivables from the IMF	A2.1	286	298	487	2,322	2,566	3,027	3,231	3,146	2,886	2,828	3,049
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	4,918	6,894	5,856	3,275	4,581	5,419	5,984	5,817	8,721	8,809	9,161
Claims on EA residents in FC	A3	1,621	1,215	13,286	173	85	4,544	1,026	695	829	1,221	1,940
Claims on non-Euro Residents in €	A4	604	987	1,634	1,596	2,685	2,040	1,532	1,858	2,041	1,489	1,246
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	12,151	12,695	22,533	20,236	8,182	10,612	15,894	7,094	12,659	14,223	11,346
MRO	A5.1	9,287	8,703	9,107	1,680	4,209	3,428	180	1,220	3,076	3,465	1,510
LTRO	A5.2	2,864	3,991	13,408	18,556	3,488	7,184	15,714	5,874	9,583	10,658	9,836
FTRO	A5.3	-	-	-	-	485	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	0	0	4,400	0	0	0	0	0	0	0	0
Securities of EA Residents (€)	A7	3,277	4,633	5,443	10,012	16,403	18,753	16,775	16,862	16,404	29,701	46,192
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	678	3,825	7,564	7,893	7,102	6,129	19,256	37,087
Other Securities	A7.2	3,277	4,633	5,443	9,334	12,578	11,190	8,882	9,760	10,275	10,444	9,105
Claims on the Government	A8	424	419	429	427	420	416	413	411	408	405	401
Intra-Eurosystem Claims	A9	16,951	19,964	14,838	18,146	26,182	34,095	43,284	43,507	30,023	29,594	30,318
Participating Interest in the ECB	A9.1	116	117	117	112	144	177	209	212	222	222	222
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	1,157	1,161	1,161	1,119	1,119	1,119	1,119	1,123	1,138	1,138	1,138
Claims Related to Allocation of € Banknotes	A9.3	15,677	18,686	13,560	16,915	24,920	32,799	41,956	42,173	28,664	28,235	28,959
Net claims Arising from Balances of T2	A9.4	-	-	-	-	-	-	-	-	-	-	-
Items in Course of Settlement	A10	103	101	103	106	73	26	0	-	-	-	-
Other Assets	A11	8,562	9,625	9,206	8,421	9,087	9,463	9,877	10,252	9,964	9,957	9,018
TOTAL ASSETS		**53,378**	**61,946**	**83,810**	**71,614**	**79,766**	**99,348**	**109,369**	**97,485**	**92,827**	**106,987**	**122,556**

Table I: The Balance Sheet of the National Central Bank of Austria (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	16,815	18,053	20,297	20,640	21,492	22,687	23,298	24,497	26,237	27,795	28,893
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	4,474	6,548	15,642	15,513	11,699	20,801	23,228	14,938	12,636	21,532	27,446
Current Accounts	L2.1	4,429	6,153	8,018	6,042	6,766	9,042	19,932	12,037	11,676	20,209	23,155
Deposit Facility	L2.2	45	395	7,624	9,471	4,878	10,610	3,297	2,181	960	1,323	4,291
Fixed-Term Deposits	L2.3	-	-	-	-	55	1,150	-	720	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Institutions in €	L3	-	-	50	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4	6	17	81	65	69	44	287	309	2,689	6,602	11,500
General government	L4.1	5	11	9	62	68	8	203	216	181	840	3,370
Other liabilities	L4.2	1	6	72	4	1	36	83	93	2,508	5,762	8,130
Liabilities to non-Euro Area Residents	L5	14	15	3	7	5	6	25	247	461	737	999
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	0	0	0	0	0	0	0	0	0	0	0
Liabilities to non-EA Residents in FC	L7	493	676	-	-	-	-	20	-	-	-	-
Counterpart of SDR Allocated by the IMF	L8	204	192	198	1,890	2,009	2,060	2,024	1,942	2,070	2,210	2,213
Intra-Eurosystem Liabilities	L9	21,160	25,402	35,662	19,584	27,496	34,614	39,897	39,148	30,083	29,147	31,138
Items in Course of Settlement	L10	-	25	31	25	1	1	-	0	-	0	-
Other Liabilities	L11	435	473	287	440	417	501	502	358	437	706	440
Provisions	L12	2,461	2,866	2,939	3,523	3,698	4,065	4,736	5,004	5,365	5,831	5,953
Revaluation Accounts	L13	3,176	3,529	4,474	5,757	8,690	10,366	11,125	6,806	8,595	8,125	9,662
Capital and Reserves	L14	4,126	4,133	4,142	4,149	4,166	4,185	4,198	4,217	4,229	4,246	4,294
Profit for the Year	L15	14	17	3	21	22	19	28	20	26	56	18
TOTAL LIABILITIES		**53,378**	**61,946**	**83,810**	**71,614**	**79,766**	**99,348**	**109,369**	**97,485**	**92,827**	**106,987**	**122,556**

Table II: The Balance Sheet of the National Central Bank of Belgium

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	3,533	4,158	4,547	5,606	7,720	8,899	9,223	6,370	7,223	7,115	8,028
Claims on non-Euro Residents in Foreign Currency (FC)	A2	6,621	6,997	6,663	11,080	12,409	13,927	14,022	13,109	13,826	15,050	14,411
Receivables from the IMF	A2.1	958	816	1,208	5,771	6,624	7,814	7,832	7,234	7,235	7,256	6,429
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	5,663	6,181	5,455	5,310	5,786	6,113	6,189	5,875	6,592	7,794	7,982
Claims on EA residents in FC	A3	269	794	36,120	246	421	7,896	242	269	455	349	396
Claims on non-Euro Residents in €	A4	346	187	344	507	582	773	663	555	563	419	805
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	39,910	56,312	57,967	41,277	7,215	40,421	40,010	15,985	11,676	7,738	14,322
MRO	A5.1	39,100	51,050	4,185	5,002	3,100	8,211	90	1,700	500	100	200
LTRO	A5.2	810	5,262	52,050	36,275	4,115	17,965	39,920	14,285	10,335	7,638	14,122
FTRO	A5.3	-	-	-	-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	1,732	-	-	14,245	-	-	841	-	-
Other Claims on EA Credit Institutions (€)	A6	351	31	2,851	2,388	2,299	9,234	1,439	2	1	174	1,863
Securities of EA Residents (€)	A7	4,479	5,109	15,176	15,305	19,088	23,396	22,962	21,369	21,484	38,212	72,989
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	984	4,768	9,114	8,956	7,603	7,041	23,652	59,067
Other Securities	A7.2	4,479	5,109	15,176	14,321	14,320	14,282	14,007	13,766	14,443	14,559	13,922
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	23,803	25,502	24,374	20,235	20,052	17,972	15,344	14,244	14,429	13,570	11,380
Participating Interest in the ECB	A9.1	143	144	144	140	180	221	261	264	287	287	287
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	1,419	1,423	1,423	1,397	1,397	1,397	1,397	1,401	1,436	1,436	1,436
Claims Related to Allocation of € Banknotes	A9.3	22,241	23,935	22,807	18,698	18,475	16,354	13,686	12,579	12,706	11,847	9,657
Net claims Arising from Balances of T2	A9.4	-	-	-	-	-	-	-	-	-	-	-
Items in Course of Settlement	A10	-	-	-	-	-	-	-	-	-	-	-
Other Assets	A11	3,463	13,266	5,162	4,818	4,911	5,198	5,849	5,897	5,868	6,339	6,986
TOTAL ASSETS		**82,776**	**112,356**	**153,205**	**101,461**	**74,698**	**127,715**	**109,753**	**77,800**	**75,525**	**88,966**	**131,180**

Table II: The Balance Sheet of the National Central Bank of Belgium (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	20,619	22,129	24,878	25,785	26,849	28,343	29,107	30,574	33,114	35,087	36,473
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	7,928	17,789	10,804	14,777	12,996	22,570	19,572	13,798	10,763	25,224	50,686
Current Accounts	L2.1	7,928	16,735	9,197	11,881	11,778	9,613	6,481	10,621	6,976	9,997	11,606
Deposit Facility	L2.2	-	4	1,607	2,896	718	10,797	11,291	852	3,788	15,226	39,080
Fixed-Term Deposits	L2.3	-	1,050	-	-	500	2,160	1,800	2,325	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	-	-	130	226	22	-	-	-	-	173	139
Liabilities to Other EA Residents	L4	60	55	85	116	131	540	568	268	286	244	328
General government	L4.1	46	45	58	108	82	65	296	126	49	38	35
Other liabilities	L4.2	13	10	27	8	49	475	272	142	237	206	293
Liabilities to non-Euro Area Residents	L5	522	413	274	258	269	340	329	440	159	1,037	2,096
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	-	-	-	680	1,264	298	-	-	-	-
Liabilities to non-EA Residents in FC	L7	705	1,564	2,530	2,207	1,657	1,740	1,107	-	-	142	2,058
Counterpart of SDR Allocated by IMF	L8	554	521	536	4,706	5,003	5,131	5,040	4,835	5,155	5,503	5,511
Intra-Eurosystem Liabilities	L9	45,269	61,660	104,243	42,490	13,871	52,859	38,059	15,454	12,335	7,726	18,589
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	638	848	1,066	655	743	895	579	527	739	623	808
Provisions	L12	932	948	1,157	142	78	34	11	-	-	-	-
Revaluation Accounts	L13	3,246	3,930	4,655	5,515	7,690	9,014	9,433	6,310	7,409	7,441	8,370
Capital and Reserves	L14	2,059	2,216	2,401	2,672	3,877	4,087	4,312	4,648	4,885	5,217	5,485
Profit for the Year	L15	244	283	445	1,912	832	899	1,337	947	680	550	638
TOTAL LIABILITIES		**82,776**	**112,356**	**153,205**	**101,461**	**74,698**	**127,715**	**109,753**	**77,800**	**75,525**	**88,966**	**131,180**

Table III: The Balance Sheet of the National Central Bank of Cyprus

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1			278	342	472	544	563	389	441	435	490
Claims on non-Euro Residents in Foreign Currency (FC)	A2			428	541	374	391	343	278	352	75	470
Receivables from the IMF	A2.1			29	161	178	262	231	221	228	229	212
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2			398	380	196	130	113	57	123	146	259
Claims on EA residents in FC	A3			771	522	536	399	172	26	15	12	18
Claims on non-Euro Residents in €	A4			69	-	-	-	-	-	5	5	5
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5			4,370	7,559	5,466	5,521	411	1,600	1,116	886	650
MRO	A5.1			1,490	30	613	2,655	-	400	380	150	
LTRO	A5.2			2,880	7,529	4,853	2,807	411	1,200	736	736	650
FTRO	A5.3			-	-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5			-	-	-	59	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6			85	1	0	0	9,400	9,550	7,400	3,800	200
Securities of EA Residents (€)	A7			2,446	2,473	2,917	2,485	1,634	881	856	2,226	3,629
Securities Held for Monetary Policy Purposes	A7.1			-	51	247	462	427	352	354	1,323	2,847
Other Securities	A7.2			2,446	2,422	2,669	2,022	1,207	529	502	903	782
Claims on the Government	A8			1,597	1,551	1,503	1,454	1,403	1,351	1,297	1,242	1,185
Intra-Eurosystem Claims	A9			203	260	419	662	976	109	127	2,902	7,074
Participating Interest in the ECB	A9.1			23	27	29	31	34	32	39	39	39
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2			72	79	79	79	79	77	88	88	88
Claims Related to Allocation of € Banknotes	A9.3			108	154	311	552	864	-	-	402	1,100
Net claims Arising from Balances of T2 A/Cs	A9.4			-	-	-	-	-	-	-	2,374	5,846
Items in Course of Settlement	A10			66	40	29	57	32	38	37	35	35
Other Assets	A11			378	168	168	3,644	120	82	82	87	90
TOTAL ASSETS				**10,691**	**13,458**	**11,884**	**15,158**	**15,054**	**14,305**	**11,729**	**12,004**	**13,845**

Table III: The Balance Sheet of the National Central Bank of Cyprus (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1			1,341	1,456	1,516	1,600	1,643	1,688	2,023	2,140	2,224
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2			1,292	3,101	2,289	3,173	3,984	2,773	4,131	7,210	9,037
Current Accounts	L2.1			1,292	1,237	1,192	1,572	1,903	1,008	1,995	5,109	6,673
Deposit Facility	L2.2			1	1,864	1,097	1,226	1,840	925	2,136	2,101	2,364
Fixed-Term Deposits	L2.3			-	-	-	375	241	840	-	-	-
Fine-Tuning Reverse Operations	L2.4			-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5			-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3			-	-	-	-	-	-	10	-	50
Liabilities to Other EA Residents	L4			458	453	279	930	260	967	1,250	987	815
General government	L4.1			448	445	270	924	257	928	1,239	862	718
Other liabilities	L4.2			10	8	8	5	3	38	12	125	97
Liabilities to non-Euro Area Residents	L5			107	115	103	87	29	14	9	21	23
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6			0	0	0	0	0	15	63	74	190
Liabilities to non-EA Residents in FC	L7			-	44	-	-	-	-	-	-	-
Counterpart of SDR Allocated by IMF	L8			21	145	154	158	155	149	158	169	169
Intra-Eurosystem Liabilities	L9			6,551	7,128	6,442	7,909	7,473	7,343	2,676	-	-
Items in Course of Settlement	L10			72	46	30	58	32	38	37	35	35
Other Liabilities	L11			291	241	258	302	236	255	281	292	195
Provisions	L12			160	182	204	231	415	285	433	285	285
Revaluation Accounts	L13			326	370	478	549	567	382	441	425	474
Capital and Reserves	L14			62	64	117	145	148	170	216	249	272
Profit for the Year	L15			9	115	15	17	112	225		116	74
TOTAL LIABILITIES				**10,691**	**13,458**	**11,884**	**15,158**	**15,055**	**14,305**	**11,728**	**12,004**	**13,845**

Table IV: The Balance Sheet of the National Central Bank of Estonia

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1						10	10	7	8	8	9
Claims on non-Euro Residents in Foreign Currency (FC)	A2						152	216	220	352	372	323
Receivables from the IMF	A2.1						74	82	84	91	97	95
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2						78	134	136	261	275	228
Claims on EA residents in FC	A3						5	21	40	64	83	102
Claims on non-Euro Residents in €	A4						2	3	2	0	1	12
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5						-	14	5	52	75	86
MRO	A5.1						-	-	-	-	-	-
LTRO	A5.2						-	14	5	52	75	86
FTRO	A5.3						-	-	-	-	-	-
Marginal Lending Facility	A5.5						-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6						12	10	11	2	2	5
Securities of EA Residents (€)	A7						544	565	497	445	1,495	3,399
Securities Held for Monetary Policy Purposes	A7.1						344	373	306	244	1,385	3,339
Other Securities	A7.2						200	191	191	202	111	59
Claims on the Government	A8						-	-	-	-	-	-
Intra-Eurosystem Claims	A9						2,333	3,398	3,451	5,060	4,647	2,758
Participating Interest in the ECB	A9.1						80	83	83	89	89	89
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2						103	103	103	112	112	112
Claims Related to Allocation of € Banknotes	A9.3						1,502	1,446	1,413	1,655	1,672	1,620
Net claims Arising from Balances of T2 A/Cs	A9.4						648	1,766	1,852	3,205	2,774	938
Items in Course of Settlement	A10						-	-	-	-	-	-
Other Assets	A11						44	45	41	46	54	67
TOTAL ASSETS							**3,102**	**4,282**	**4,274**	**6,030**	**6,738**	**6,761**

Table IV: The Balance Sheet of the National Central Bank of Estonia (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1						2,141	2,149	2,252	2,577	2,730	2,838
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2						466	1,528	1,417	2,800	3,331	3,192
Current Accounts	L2.1						253	518	492	1,550	3,331	3,192
Deposit Facility	L2.2						54	-	455	1,250	-	-
Fixed-Term Deposits	L2.3						159	1,010	470	-	-	-
Fine-Tuning Reverse Operations	L2.4						-	-	-	-	-	-
Deposits related to Margin Calls	L2.5						-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3						-	-	-	-	-	-
Liabilities to Other EA Residents	L4						9	10	12	9	12	18
General government	L4.1						-	-	-	-	-	7
Other liabilities	L4.2						9	10	12	9	12	11
Liabilities to non-Euro Area Residents	L5						0	0	0	0	0	5
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6						-	-	-	-	-	16
Liabilities to non-EA Residents in FC	L7						-	19	-	-	-	-
Counterpart of SDR Allocated by IMF	L8						74	72	69	74	79	79
Intra-Eurosystem Liabilities	L9						-	-	-	-	-	-
Items in Course of Settlement	L10						-	-	-	-	-	-
Other Liabilities	L11						39	86	89	103	100	58
Provisions	L12						0	12	18	26	30	67
Revaluation Accounts	L13						10	14	10	23	11	19
Capital and Reserves	L14						341	358	384	402	414	437
Profit for the Year	L15						23	34	23	17	30	31
TOTAL LIABILITIES							**3,102**	**4,282**	**4,274**	**6,030**	**6,738**	**6,761**

Table V: The Balance Sheet of the National Central Bank of Finland

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	761	896	980	1,208	1,664	1,918	1,988	1,373	1,557	1,534	1,731
Claims on non-Euro Residents in Foreign Currency (FC)	A2	4,749	4,514	4,597	6,226	5,223	5,886	6,171	6,585	7,019	7,482	7,852
Receivables from the IMF	A2.1	279	260	356	1,609	1815	1,967	2,097	1,955	1,913	1,890	2,048
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	4,470	4,254	4,241	4,617	3,408	3,919	4,074	4,630	5,106	5,592	5,804
Claims on EA residents in FC	A3	1,061	1,394	2,577	1,120	712	628	404	297	360	417	648
Claims on non-Euro Residents in €	A4	368	394	581	845	1,662	1,946	1,970	1,347	1,044	1,443	1,803
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	1,025	230	2,600	2,710	50	2,311	3,681	2,475	722	690	6,728
MRO	A5.1	500	30	350	20	-	10	-	-	15	-	-
LTRO	A5.2	525	200	2,250	2,690	50	2,301	3,681	2,475	707	690	6,728
FTRO	A5.3	-	-	-	-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	60	3	-	126	1	40	-	-	36	-	31
Securities of EA Residents (€)	A7	4,998	6,863	7,265	8,002	11,669	13,890	11,470	10,063	11,316	19,662	32,761
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	531	2,203	4,637	4,555	3,717	3,568	12,074	25,786
Other Securities	A7.2	4,998	6,863	7,265	7,471	9,466	9,253	6,915	6,346	7,748	7,588	6,975
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	5,886	7,465	10,161	14,280	23,921	70,335	74,381	26,539	24,583	25,096	26,609
Participating Interest in the ECB	A9.1	74	73	73	78	99	120	141	141	144	144	144
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	717	717	717	722	722	722	722	722	728	728	728
Claims Related to Allocation of € Banknotes	A9.3	3,938	3,724	4,174	3,945	3,414	3,485	3,248	3,522	3,962	4,103	3,879
Net claims Arising from Balances of T2 A/Cs	A9.4	1,157	2,951	5,197	9,535	19,686	66,008	70,270	22,154	19,749	20,121	21,858
Items in Course of Settlement	A10	-	-	-	-	-	-	-	-	-	-	-
Other Assets	A11	933	1,048	1,254	1,130	1,090	1,171	1,115	1,052	1,082	1,088	1,341
TOTAL ASSETS		**19,841**	**22,807**	**30,015**	**35,647**	**45,992**	**98,125**	**101,180**	**49,731**	**47,719**	**57,412**	**79,504**

Table V: The Balance Sheet of the National Central Bank of Finland (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	10,419	11,148	12,532	13,330	13,880	14,649	15,044	15,753	16,793	17,790	18,492
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	3,766	5,910	8,110	13,543	21,696	71,697	73,799	23,803	20,308	27,559	47,665
Current Accounts	L2.1	3,765	2,901	1,015	8,085	9,383	1,657	31,698	14,303	20,233	25,889	29,065
Deposit Facility	L2.2	1	9	7,095	5,458	9,113	52,540	37,101	-	75	1,670	18,600
Fixed-Term Deposits	L2.3	-	3,000	-	-	3,200	17,500	5,000	9,500	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4	-	-	3,009	14	262	836	801	55	2	79	31
General government	L4.1	-	-	3,009	14	262	836	801	55	2	79	31
Other liabilities	L4.2	-	-	-	-	-	-	-	-	-	-	-
Liabilities to non-Euro Area Residents	L5	4	4	37	234	1,021	782	1,004	527	2	676	1,625
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	-	-	248	-	-	-	-	-	-	-
Liabilities to non-EA Residents in FC	L7	-	88	-	363	23	153	139	66	58	46	-
Counterpart of SDR Allocated by IMF	L8	163	153	158	1,295	1,377	1,412	1,387	1,330	1,418	1,514	1,516
Intra-Eurosystem Liabilities	L9	-	-	-	-	33	76	-	-	-	-	-
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	162	171	191	155	151	178	24	21	22	12	32
Provisions	L12	2,676	2,368	2,092	2,325	2,814	3,032	3,708	3,939	4,163	4,317	4,468
Revaluation Accounts	L13	762	854	1,622	1,703	2,274	2,806	2,609	1,556	2,304	2,762	2,982
Capital and Reserves	L14	1,596	1,704	1,864	2,015	2,175	2,262	2,332	2,442	2,501	2,514	2,562
Profit for the Year	L15	293	410	401	420	283	254	337	239	150	146	131
TOTAL LIABILITIES		**19,841**	**22,810**	**30,016**	**35,645**	**45,989**	**98,137**	**101,184**	**49,731**	**47,721**	**57,415**	**79,504**

Table VI: The Balance Sheet of the National Central Bank of France

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	42,210	47,557	49,802	60,006	82,640	95,282	98,751	68,217	77,343	76,211	85,993
Claims on non-Euro Residents in Foreign Currency (FC)	A2	30,410	25,304	23,716	36,953	46,340	40,720	48,708	37,069	40,949	50,091	55,309
Receivables from the IMF	A2.1	1,804	1,448	2,323	13,136	14,732	17,604	18,119	17,023	17,198	17,292	16,071
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	28,606	23,856	21,393	23,817	31,608	23,116	30,589	20,046	23,751	32,799	39,238
Claims on EA residents in FC	A3	7,396	14,040	65,593	13,954	11,940	44,609	8,072	14,212	16,108	18,951	12,057
Claims on non-Euro Residents in €	A4	2,303	2,257	5,793	2,940	6,901	10,113	6,539	6,363	3,226	4,376	3,778
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	13,695	71,055	134,463	120,984	34,984	129,336	181,933	74,250	76,054	89,303	70,730
MRO	A5.1	12,037	24,751	16,750	1,980	11,955	6,098	7,611	11,875	11,691	7,362	117
LTRO	A5.2	1,647	46,118	116,117	117,275	20,221	123,140	172,879	61,525	64,208	81,851	70,613
FTRO	A5.3	-	-	-	-	2,800	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	1,106	1,244	-	-	-	-	-	-	-
Accrued Interest Receivable	A5.6	11	186	490	485	8	98	1,443	850	155	90	
Other Claims on EA Credit Institutions (€)	A6	2,149	3,925	20,711	11,668	24,716	51,420	45,182	38,038	44,144	30,538	15,379
Securities of EA Residents (€)	A7	8,222	14,511	68,740	68,717	90,415	139,294	130,427	124,183	121,039	243,312	408,589
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	4,201	21,336	48,756	51,802	45,139	42,483	162,656	335,299
Other Securities	A7.2	8,222	14,511	68,740	64,516	69,079	90,538	78,625	79,043	78,557	80,656	73,290
Claims on the Government	A8	82	42	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	83,447	76,766	85,322	84,087	85,998	87,622	85,163	86,965	91,282	97,951	98,822
Participating Interest in the ECB	A9.1	835	836	836	825	1,062	1,299	1,536	1,535	1,545	1,545	1,545
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	8,476	8,569	8,577	8,283	8,263	8,281	8,255	8,230	8,229	8,221	8,218
Claims Related to Allocation of € Banknotes	A9.3	63,452	67,312	75,572	74,811	76,506	77,576	74,845	76,822	81,199	88,022	88,864
Net claims Arising from Balances of T2 A/Cs	A9.4	10,684	49	337	168	167	467	527	378	309	164	195
Items in Course of Settlement	A10											
Other Assets	A11	42,248	105,252	98,879	106,743	97,692	110,854	127,007	100,710	107,593	99,631	94,705
TOTAL ASSETS		**232,162**	**360,709**	**553,019**	**506,052**	**481,626**	**709,250**	**731,782**	**550,007**	**577,738**	**710,364**	**845,362**

Table VI: The Balance Sheet of the National Central Bank of France (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	120,229	128,852	144,862	151,174	157,415	166,160	170,641	178,754	189,498	200,781	208,710
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	26,378	73,698	90,843	61,076	44,643	171,001	189,832	106,980	109,955	219,802	328,789
Current Accounts	L2.1	26,377	49,266	67,693	34,314	32,911	53,163	104,368	68,174	95,753	133,034	181,597
Deposit Facility	L2.2	-	-	23,150	26,762	10,982	51,262	84,570	28,217	14,202	86,768	147,192
Fixed-Term Deposits	L2.3	-	23,000	-	-	750	66,576	894	10,589	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	1	1,432	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	18	40	139	62	1,688	1,874	926	20	15	10	3,953
Liabilities to Other EA Residents	L4	4,498	4,290	17,112	25,083	5,504	13,151	10,135	7,617	6,612	19,878	23,288
General government	L4.1	235	309	13,045	19,005	1,487	8,937	4,883	3,266	2,438	13,869	13,882
Other liabilities	L4.2	4,263	3,981	4,067	6,078	4,017	4,214	5,252	4,351	4,174	6,009	9,406
Liabilities to non-Euro Area Residents	L5	8,175	10,737	21,566	22,375	20,042	18,699	35,593	28,067	28,472	15,039	36,447
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	7,580	11,874	8,356	9,801	12,264	8,901	5,863	3,154	1,170	933	976
Liabilities to non-EA Residents in FC	L7	-	-	-	-	-	-	-	-	-	-	-
Counterpart of SDR Allocated by IMF	L8	1,241	1,167	1,195	11,037	11,734	12,030	11,815	11,335	12,085	12,900	12,922
Intra-Eurosystem Liabilities	L9	-	12,035	117,880	62,077	28,363	77,515	54,850	16,195	17,020	29,315	14,123
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	29,009	73,598	93,912	104,020	93,653	122,826	129,901	108,905	109,818	103,942	95,703
Provisions	L12	577	675	1,984	1,663	1,221	1,015	932	924	927	898	916
Revaluation Accounts	L13	21,633	27,558	31,978	42,892	67,961	81,709	85,050	52,037	65,335	68,438	79,246
Capital and Reserves	L14	11,212	13,292	20,453	12,059	34,366	32,697	32,890	33,487	34,607	36,100	36,539
Profit for the Year	L15	1,246	2,317	2,460	2,473	2,559	1,570	3,146	2,441	2,066	2,228	3,522
TOTAL LIABILITIES		**232,160**	**360,707**	**553,019**	**506,050**	**481,626**	**709,250**	**731,780**	**550,006**	**577,737**	**710,364**	**845,259**

Table VII: The Balance Sheet of the National Central Bank of Germany

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	53,114	62,433	68,194	83,939	115,403	132,874	137,513	94,876	107,475	105,792	119,253
Claims on non-Euro Residents in Foreign Currency (FC)	A2	31,651	30,112	30,990	41,603	46,697	51,729	51,118	48,878	51,270	53,740	56,512
Receivables from the IMF	A2.1	3,011	2,418	3,285	15,969	18,740	22,296	22,344	20,798	20,624	20,317	21,519
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	28,640	27,694	27,705	25,634	27,957	29,433	28,774	28,080	30,646	33,423	34,993
Claims on EA residents in FC	A3	-	7,051	63,263	4,412	-	18,128	3,341	125	-	-	1,788
Claims on non-Euro Residents in €	A4	300	300	300	300	-	-	-	-	-	-	438
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	256,348	267,955	277,424	223,610	103,076	55,796	73,093	52,055	65,572	58,096	65,474
MRO	A5.1	173,940	133,095	75,291	53,605	68,376	8,635	2,855	38,162	32,544	9,127	1,807
LTRO	A5.2	82,329	134,769	201,383	170,004	33,460	47,112	69,651	13,771	32,944	48,630	63,518
FTRO	A5.3	-	-	-	-	1,240	-	-	-	-	-	-
Marginal Lending Facility	A5.5	79	91	750	1	-	49	587	122	84	339	149
Other Claims on EA Credit Institutions (€)	A6	3,049	13,077	22,031	7,136	9,610	8,464	1,442	4,691	2,011	3,540	3,025
Securities of EA Residents (€)	A7	-	-	-	13,168	36,145	71,867	67,487	55,844	50,224	172,275	357,700
Securities Held for Monetary Policy	A7.1	-	-	-	7,892	30,899	66,981	67,487	55,844	50,224	172,275	357,700
Other Securities	A7.2	-	-	-	5,276	5,246	4,886	-	-	-	-	-
Claims on the Government	A8	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440
Intra-Eurosystem Claims	A9	18,273	83,950	128,554	189,706	337,851	475,894	667,895	523,370	473,007	596,929	766,912
Participating Interest in the ECB	A9.1	1,183	1,196	1,196	1,091	1,407	1,722	2,038	2,031	1,948	1,948	1,948
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	11,762	11,821	11,821	10,909	10,909	10,909	10,909	10,872	10,430	10,430	10,430
Claims Related to Allocation of € BN	A9.3	-	-	-	-	-	-	-	-	-	-	-
Net claims Arising from Balances of T2	A9.4	5,328	70,933	115,537	177,706	325,535	463,263	654,948	510,467	460,629	584,551	754,534
Items in Course of Settlement	A10	1	4	2	2	1	3	2	3	1	1	1
Other Assets	A11	6,360	14,351	17,362	19,729	18,036	18,447	18,977	16,753	16,842	17,159	17,471
TOTAL ASSETS		**373,536**	**483,673**	**612,560**	**588,045**	**671,259**	**837,642**	**1,025,30**	**801,035**	**770,842**	**1,011,972**	**1,393,014**

Table VII: The Balance Sheet of the National Central Bank of Germany (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	170,881	183,781	206,620	201,304	209,615	221,264	227,231	237,258	240,518	254,844	264,907
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	47,956	109,513	166,939	112,163	146,432	228,872	299,962	141,459	90,195	208,741	411,350
Current Accounts	L2.1	47,913	64,032	100,678	76,665	71,407	76,408	129,607	83,877	81,176	155,149	284,948
Deposit Facility	L2.2	43	4,931	66,261	35,498	38,536	66,069	40,470	10,712	9,019	53,584	126,402
Fixed-Term Deposits	L2.3	-	40,550	-	-	36,489	86,395	129,885	46,870	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	8	-
Other Liabilities to EA Credit Inst. €	L3	-	-	-	-	-	-	-	-	-	-	466
Liabilities to Other EA Residents	L4	405	448	816	10,350	929	5,501	39,929	10,466	9,870	71,889	105,829
General government	L4.1	36	43	170	9,987	173	745	11,870	2,013	1,940	11,647	32,458
Other liabilities	L4.2	369	405	646	363	756	4,756	28,059	8,453	7,930	60,242	73,371
Liabilities to non-Euro Area Residents	L5	3,746	14,045	9,226	9,124	14,460	46,552	83,284	52,047	12,262	27,179	117,016
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	3	4	18,401	36	15	7	3	1,830	34	35	4
Liabilities to non-EA Residents in FC	L7	1,061	1,951	2,540	-	159	-	76	37	788	571	1,218
Counterpart of SDR Allocated by IMF	L8	1,382	1,300	1,338	13,127	13,955	14,311	14,058	13,486	14,380	15,349	15,371
Intra-Eurosystem Liabilities	L9	84,334	99,498	121,759	146,806	157,105	170,489	200,308	224,251	267,914	297,786	327,262
Items in Course of Settlement	L10	4	5	4	6	2	1	1	2	1	2	1
Other Liabilities	L11	3,255	3,610	3,540	2,639	2,886	3,545	3,317	3,305	2,739	2,058	2,092
Provisions	L12	5,370	5,190	7,011	6,562	7,996	12,046	18,898	19,221	19,696	19,608	21,879
Revaluation Accounts	L13	45,933	55,044	63,108	76,778	110,502	129,411	132,577	88,080	104,491	105,720	119,658
Capital and Reserves	L14	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,564
Profit for the Year	L15	4,205	4,285	6,261	4,147	2,206	643	664	4,591	2,954	3,189	399
TOTAL LIABILITIES		373,535	483,674	612,563	588,042	671,262	837,642	1,025,308	801,033	770,842	1,011,971	1,393,016

Table VIII: The Balance Sheet of the National Central Bank of Greece

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	2,211	2,617	2,925	3,633	5,005	5,770	5,985	4,145	4,721	4,656	5,262
Claims on non-Euro Residents in Foreign Currency (FC)	A2	486	439	302	1,108	1,010	982	993	1,059	1,571	2,046	2,579
Receivables from the IMF	A2.1	126	83	139	948	909	942	926	890	948	636	737
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	360	356	163	161	101	40	67	169	623	1,410	1,841
Claims on EA residents in FC	A3	553	700	2,474	282	284	1,019	344	324	600	613	205
Claims on non-Euro Residents in €	A4	649	1,002	831	0	0	0	0	0	0	0	0
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	4,795	8,727	38,355	49,655	97,669	76,160	19,347	63,226	56,039	38,599	22,953
MRO	A5.1	3,083	6,759	22,765	2,355	18,023	15,178	17,402	61,781	47,149	26,570	15,430
LTRO	A5.2	1,712	1,968	15,584	47,300	78,383	60,942	1,945	1,385	8,890	12,000	7,500
FTRO	A5.3	-	-	-	-	1,263	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	6	-	-	40	-	60	-	29	23
Other Claims on EA Credit Institutions (€)	A6	942	232	77	73	73	52,009	101,851	9,791	1	68,915	43,665
Securities of EA Residents (€)	A7	6,298	10,519	14,529	20,668	23,861	21,149	20,783	21,364	31,057	39,764	57,197
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	674	4,898	7,766	6,965	6,070	5,786	20,711	42,484
Other Securities	A7.2	6,298	10,519	14,529	19,994	18,963	13,383	13,818	15,294	25,270	19,053	14,713
Claims on the Government	A8	8,745	8,232	7,778	7,294	6,867	6,660	6,170	5,658	5,249	4,844	6,353
Intra-Eurosystem Claims	A9	1,454	1,444	1,483	1,598	1,600	1,633	1,814	1,743	1,774	1,782	1,854
Participating Interest in the ECB	A9.1	393	390	390	435	468	501	534	531	565	565	565
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	1,056	1,047	1,047	1,132	1,132	1,132	1,132	1,129	1,178	1,178	1,178
Claims Related to Allocation of € Banknotes	A9.3	-	-	-	-	-	-	-	-	-	-	-
Net claims Arising from Balances of T2	A9.4	5	7	46	31	-	-	148	82	31	39	111
Items in Course of Settlement	A10	2	3	1	2	0	0	2	2	-	-	-
Other Assets	A11	8,790	8,746	2,167	2,280	2,272	3,054	2,490	2,185	2,146	2,294	2,316
TOTAL ASSETS		**34,925**	**42,661**	**70,920**	**86,594**	**138,641**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Table VIII: The Balance Sheet of the National Central Bank of Greece (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	15,338	16,270	18,291	20,886	21,748	22,958	23,577	24,641	27,172	28,792	29,929
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	4,530	7,108	7,794	8,008	10,528	4,703	2,169	1,959	3,076	1,387	907
Current Accounts	L2.1	4,527	6,603	4,931	4,616	3,303	2,506	1,369	749	2,926	1,259	877
Deposit Facility	L2.2	3	5	2,863	3,392	7,165	1,180	410	1,150	150	-	-
Fixed-Term Deposits	L2.3	-	500	-	-	60	-	-	-	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	1,017	389	60	-	128	31
Other Liabilities to EA Credit Inst. in €	L3	22	33	-	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4	913	1,216	1,598	1,381	2,339	5,553	7,191	7,986	4,378	5,085	9,527
General government	L4.1	894	1,159	1,521	1,333	782	3,838	5,721	6,943	3,521	3,749	8,270
Other liabilities	L4.2	19	56	77	48	1,558	1,715	1,470	1,043	857	1,336	1,257
Liabilities to non-Euro Area Residents	L5	852	839	804	720	766	1,042	1,008	990	1,438	1,228	2,461
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	84	81	103	73	22	16	32	77	302	646	752
Liabilities to non-EA Residents in FC	L7	112	102	79	85	0	0	0	0	0	0	0
Counterpart of SDR Allocated by IMF	L8	118	111	114	852	905	928	912	875	933	-	-
Intra-Eurosystem Liabilities	L9	9,752	13,196	37,833	49,122	95,055	123,245	112,815	61,955	54,502	113,977	85,571
Items in Course of Settlement	L10	55	44	26	26	23	15	3	2	3	1	1
Other Liabilities	L11	779	747	729	765	787	1,160	792	1,168	706	1,310	1,227
Provisions	L12	1,052	1,174	1,507	1,953	2,385	3,951	6,213	6,652	6,789	7,199	7,477
Revaluation Accounts	L13	651	965	1,249	1,917	3,264	4,050	4,250	2,376	3,043	3,072	3,716
Capital and Reserves	L14	667	775	794	805	815	815	815	816	815	815	815
Profit for the Year^	L15	-	-	-	-	-	-	-	-	-	-	-
TOTAL LIABILITIES		**34,925**	**42,661**	**70,920**	**86,594**	**138,640**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

^The profit and loss account for the year has been reclassified as per Annual Report published by the Central Bank of Greece.

Table IX: The Balance Sheet of the National Central Bank of Ireland

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	93	110	120	148	204	235	244	168	191	188	212
Claims on non-Euro Residents in Foreign Currency (FC)	A2	566	522	587	1,346	1,382	1,081	1,051	1,019	1,270	1,836	3,191
Receivables from the IMF	A2.1	172	128	188	989	1,008	1,061	1,049	1,016	1,085	1,158	1,858
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	394	394	399	357	374	20	3	3	185	678	1,333
Claims on EA residents in FC	A3	59	446	5,063	119	141	1,174	496	-	-	-	-
Claims on non-Euro Residents in €	A4	3,243	1,553	1,274	1,234	883	1,231	1,229	1,515	2,127	2,813	2,653
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	27,044	39,449	93,412	92,858	132,010	107,236	70,936	39,046	20,700	10,735	7,418
MRO	A5.1	10,822	12,140	44,431	8,425	63,655	30,520	7,850	4,545	4,050	2,300	-
LTRO	A5.2	16,222	27,309	48,981	84,433	56,025	76,286	63,086	34,501	16,650	8,435	7,418
FTRO	A5.3	-	-	-	-	12,330	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	-	-	-	430	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	1,060	429	114	636	514	42,849	40,426	562	351	373	160
Securities of EA Residents (€)	A7	7,137	9,884	14,222	14,922	18,236	20,731	21,264	63,817	55,096	59,631	67,255
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	532	3,003	4,790	4,363	3,307	3,396	11,103	22,434
Other Securities	A7.2	7,137	9,884	14,222	14,391	15,233	15,941	16,901	60,510	51,700	48,527	44,821
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	570	569	585	796	779	808	886	857	895	885	890
Participating Interest in the ECB	A9.1	57	57	57	121	139	158	176	179	199	199	199
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	513	512	512	640	640	640	640	644	673	673	673
Claims Related to Allocation of € Banknotes	A9.3	-	-	-	-	-	-	-	-	-	-	-
Net claims Arising from Balances of T2	A9.4	-	-	17	36	-	10	70	33	23	14	18
Items in Course of Settlement	A10	47	7	4	3	3	13	14	23	0	0	-
Other Assets	A11	433	561	750	12,834	50,337	888	941	1,104	678	775	1,005
TOTAL ASSETS		40,253	53,529	116,132	124,896	204,489	176,247	137,486	108,110	81,308	77,235	82,786

Table IX: The Balance Sheet of the National Central Bank of Ireland (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	7,454	7,957	8,947	11,806	12,293	12,978	13,328	14,051	15,512	16,436	17,085
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	12,915	21,839	19,447	14,908	11,414	6,029	3,518	3,243	4,055	10,018	19,225
Current Accounts	L2.1	12,910	10,820	8,535	8,248	8,264	3,734	1,798	1,980	3,066	5,287	13,509
Deposit Facility	L2.2	5	3,019	10,912	6,660	3,150	2,295	1,720	1,263	988	4,730	5,716
Fixed-Term Deposits	L2.3	-	8,000	-	-	-	-	-	-	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4	5,463	8,025	25,817	26,263	15,890	15,574	19,639	10,264	6,814	13,720	10,407
General government	L4.1	5,463	8,025	25,817	26,260	15,888	15,572	19,636	10,261	6,811	13,718	10,404
Other liabilities	L4.2	0	0	-	-	2	2	3	3	3	3	3
Liabilities to non-Euro Area Residents	L5	9	2	7	7	10	23	22	17	1	76	1
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	-	-	-	-	0	0	-	0	0	0
Liabilities to non-EA Residents in FC	L7	100	-	-	-	-	-	-	-	-	-	-
Counterpart of SDR Allocated by IMF	L8	-	94	96	844	897	920	904	867	925	987	988
Intra-Eurosystem Liabilities	L9	11,933	12,896	58,739	67,234	160,181	135,870	95,200	71,593	38,767	19,289	17,832
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	1,212	1,454	1,442	2,046	1,814	2,339	2,013	1,995	2,661	2,387	2,430
Provisions	L12	12	7	77	52	36	318	417	380	280	190	333
Revaluation Accounts	L13	58	88	242	205	230	303	335	3,262	9,611	10,819	10,887
Capital and Reserves	L14	1,097	1,165	1,316	1,531	1,723	1,893	2,110	2,437	2,681	3,313	3,599
Profit for the Year	L15	-	-	-	-	-	-	-	-	-	-	-
TOTAL LIABILITIES		**40,253**	**53,529**	**116,132**	**124,896**	**204,489**	**176,247**	**137,486**	**108,110**	**81,308**	**77,235**	**82,786**

Table X: The Balance Sheet of the National Central Bank of Italy

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	38,050	44,793	48,995	60,410	83,197	95,924	99,417	68,677	77,865	76,718	86,558
Claims on non-Euro Residents in Foreign Currency (FC)	A2	19,483	19,276	26,647	31,782	35,724	38,016	38,283	36,834	39,269	43,202	42,498
Receivables from the IMF	A2.1	1,442	1,164	1,790	8,380	9,463	12,225	12,700	11,888	11,831	11,567	10,163
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	18,041	18,112	24,857	23,402	26,261	25,791	25,583	24,946	27,438	31,635	32,334
Claims on EA residents in FC	A3	6,857	5,052	6,952	1,658	2,065	2,896	2,903	886	1,241	1,213	1,288
Claims on non-Euro Residents in €	A4	-	1	9	11	6	99	629	1,405	1,516	1,521	1,554
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	20,957	28,070	50,344	27,156	47,635	209,995	271,784	235,869	194,522	158,276	204,238
MRO	A5.1	20,568	22,222	12,980	1,945	16,558	49,389	3,488	22,160	25,743	18,728	16,050
LTRO	A5.2	388	5,848	36,976	25,193	31,013	160,606	268,296	213,709	168,779	139,548	188,188
FTRO	A5.3	-	-	-	-	65	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	383	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	10	10	154	359	2,954	2,655	1,540	9,030	4,959	101	35
Securities of EA Residents (€)	A7	1,977	-	41,228	50,709	84,404	114,273	116,431	111,530	117,615	207,682	327,388
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	5,015	18,079	43,056	44,525	37,572	35,486	121,508	245,221
Other Securities	A7.2	1,977	-	41,228	45,694	66,326	71,217	71,906	73,958	82,129	86,174	82,167
Claims on the Government	A8	18,252	18,098	17,946	17,794	17,642	17,458	14,620	14,484	14,349	14,215	14,081
Intra-Eurosystem Claims	A9	30,845	43,744	31,392	63,211	11,843	8,352	12,165	21,464	30,834	40,763	43,721
Participating Interest in the ECB	A9.1	726	722	722	736	945	1,153	1,361	1,377	1,333	1,333	1,333
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	7,263	7,218	7,218	7,199	7,199	7,199	7,199	7,219	7,134	7,134	7,134
Claims Related to Allocation of € BN	A9.3	-	-	-	-	-	-	3,605	12,867	22,368	32,296	35,254
Net claims Arising from Balances of T2	A9.4	22,856	35,804	23,452	55,276	3,699	-	-	-	-	-	-
Items in Course of Settlement	A10	8	1	2	3	6	14	8	13	4	11	19
Other Assets	A11	82,118	85,330	43,762	48,163	47,485	49,297	52,194	54,216	48,450	43,701	52,293
TOTAL ASSETS		**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**609,973**	**554,407**	**530,623**	**587,404**	**773,673**

Table X: The Balance Sheet of the National Central Bank of Italy (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	105,519	112,213	126,159	132,840	138,324	146,010	149,948	157,541	164,527	174,324	181,208
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	17,159	42,623	35,441	34,313	22,740	33,878	27,665	20,789	15,436	24,138	71,984
Current Accounts	L2.1	17,157	35,071	28,435	26,283	20,226	19,762	24,593	18,392	15,058	22,600	69,957
Deposit Facility	L2.2	2	2	6,966	8,030	2,515	12,336	3,040	2,377	378	1,538	1,997
Fixed-Term Deposits	L2.3	-	7,550	-	-	-	1,780	32	20	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	41	-	-	-	-	-	-	-	30
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	-	-	-	-	8	-	-	-
Liabilities to Other EA Residents	L4	22,964	9,881	19,413	31,027	42,518	23,739	34,496	33,888	13,928	7,709	15,649
General government	L4.1	22,945	9,716	19,413	31,027	42,488	23,529	33,802	27,117	7,859	4,821	9,780
Other liabilities	L4.2	19	166	0	0	29	210	694	6,771	6,069	2,888	5,870
Liabilities to non-Euro Area Residents	L5	88	88	201	312	2,949	2,692	1,000	555	24	23	2,565
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	0	411	419	623	549	378	402	387	373	304
Liabilities to non-EA Residents in FC	L7	866	2	2	2	2	2	2	2	2	3	3
Counterpart of SDR Allocated by IMF	L8	802	754	776	7,159	7,610	7,804	7,666	7,354	7,841	8,370	8,382
Intra-Eurosystem Liabilities	L9	14,209	16,245	13,313	10,358	7,093	198,453	253,799	228,382	208,576	248,547	355,667
Items in Course of Settlement	L10	29	26	51	16	31	41	40	27	27	30	37
Other Liabilities	L11	2,246	2,286	2,644	2,292	1,949	1,709	1,653	1,335	1,457	1,545	2,095
Provisions	L12	14,323	12,887	15,342	15,802	16,913	18,223	21,317	23,359	24,923	26,518	29,629
Revaluation Accounts	L13	23,446	29,976	33,880	44,968	70,206	83,004	86,900	54,191	66,201	67,981	78,118
Capital and Reserves	L14	16,771	17,300	19,622	20,079	21,149	21,745	22,607	23,538	24,297	25,046	25,346
Profit for the Year	L15	134	95	175	1,669	852	1,129	2,501	3,035	2,998	2,797	2,686
TOTAL LIABILITIES		**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**609,973**	**554,407**	**530,623**	**587,404**	**773,673**

Table XI: The Balance Sheet of the National Central Bank of Latvia

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1									211	208	234
Claims on non-Euro Residents in Foreign Currency (FC)	A2									2,441	2,950	3,092
Receivables from the IMF	A2.1									144	154	154
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2									2,297	2,796	2,938
Claims on EA residents in FC	A3									486	541	359
Claims on non-Euro Residents in €	A4									215	169	145
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5									86	264	257
MRO	A5.1									-	-	-
LTRO	A5.2									86	264	257
FTRO	A5.3									-	-	-
Marginal Lending Facility	A5.5									-	-	-
Other Claims on EA Credit Institutions (€)	A6									4	2	9
Securities of EA Residents (€)	A7									1,095	3,015	6,320
Securities Held for Monetary Policy Purposes	A7.1									-	1,808	4,357
Other Securities	A7.2									1,095	1,207	1,962
Claims on the Government	A8									-	-	-
Intra-Eurosystem Claims	A9									3,393	3,803	4,196
Participating Interest in the ECB	A9.1									115	115	115
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2									163	163	163
Claims Related to Allocation of € BN	A9.3									3,115	3,495	3,903
Net claims Arising from Balances of T2	A9.4									-	29	15
Items in Course of Settlement	A10									-	-	
Other Assets	A11									92	166	161
TOTAL ASSETS										**8,025**	**11,119**	**14,772**

Table XI: The Balance Sheet of the National Central Bank of Latvia (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1									3,849	3,992	4,150
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2									2,423	4,784	4,191
Current Accounts	L2.1									2,073	4,784	4,191
Deposit Facility	L2.2									350	-	-
Fixed-Term Deposits	L2.3									-	-	-
Fine-Tuning Reverse Operations	L2.4									-	-	-
Deposits related to Margin Calls	L2.5									-	-	-
Other Liabilities to EA Credit Inst. in €	L3									1	9	1
Liabilities to Other EA Residents	L4									127	146	212
General government	L4.1									51	38	47
Other liabilities	L4.2									76	108	166
Liabilities to non-Euro Area Residents	L5									24	9	18
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6									145	155	160
Liabilities to non-EA Residents in FC	L7									-	0	-
Counterpart of SDR Allocated by IMF	L8									-	-	-
Intra-Eurosystem Liabilities	L9									797	1,312	5,292
Items in Course of Settlement	L10									-	-	-
Other Liabilities	L11									180	259	295
Provisions	L12									-	-	-
Revaluation Accounts	L13									-	-	-
Capital and Reserves	L14									479	451	453
Profit for the Year	L15									-	-	-
TOTAL LIABILITIES										**8,025**	**11,119**	**14,772**

Table XII: The Balance Sheet of the National Central Bank of Lithuania

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1										182	206
Claims on non-Euro Residents in Foreign Currency (FC)	A2										2,379	2,736
Receivables from the IMF	A2.1										175	175
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2										2,204	2,561
Claims on EA residents in FC	A3										116	137
Claims on non-Euro Residents in €	A4										317	71
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5										346	303
MRO	A5.1										-	-
LTRO	A5.2										346	303
FTRO	A5.3										-	-
Marginal Lending Facility	A5.5										-	-
Other Claims on EA Credit Institutions (€)	A6										0	0
Securities of EA Residents (€)	A7										3,424	6,837
Securities Held for Monetary Policy Purposes	A7.1										2,508	6,340
Other Securities	A7.2										916	497
Claims on the Government	A8										-	-
Intra-Eurosystem Claims	A9										4,490	4,057
Participating Interest in the ECB	A9.1										207	207
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2										239	239
Claims Related to Allocation of € BN	A9.3										3,751	3,556
Net claims Arising from Balances of T2	A9.4										292	54
Items in Course of Settlement	A10										-	-
Other Assets	A11										77	117
TOTAL ASSETS											**11,331**	**14,464**

Table XII: The Balance Sheet of the National Central Bank of Lithuania (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1										5,960	6,082
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2										2,842	2,481
Current Accounts	L2.1										2,842	2,481
Deposit Facility	L2.2										-	-
Fixed-Term Deposits	L2.3										-	-
Fine-Tuning Reverse Operations	L2.4										-	-
Deposits related to Margin Calls	L2.5										-	-
Other Liabilities to EA Credit Inst. in €	L3										26	-
Liabilities to Other EA Residents	L4										1,273	691
General government	L4.1										1,273	690
Other liabilities	L4.2										0	1
Liabilities to non-Euro Area Residents	L5										1	21
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6										192	373
Liabilities to non-EA Residents in FC	L7										52	46
Counterpart of SDR Allocated by IMF	L8										175	175
Intra-Eurosystem Liabilities	L9										-	3,590
Items in Course of Settlement	L10										3	1
Other Liabilities	L11										126	218
Provisions	L12										50	106
Revaluation Accounts	L13										193	224
Capital and Reserves	L14										418	429
Profit for the Year	L15										22	27
TOTAL LIABILITIES											**11,331**	**14,464**

Table XIII: The Balance Sheet of the National Central Bank of Luxembourg

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	36	42	45	55	76	88	91	63	72	70	79
Claims on non-Euro Residents in Foreign Currency (FC)	A2	164	97	239	506	560	695	660	687	639	638	843
Receivables from the IMF	A2.1	47	34	55	321	358	555	546	502	484	464	662
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	117	63	185	184	201	140	114	185	155	174	181
Claims on EA residents in FC	A3	37	1,306	10,826	71	95	3,635	1,564	1,311	2,103	1,564	1,337
Claims on non-Euro Residents in €	A4	1,301	1,254	2,235	1,601	1,560	2,045	1,299	1,026	1,529	1,300	806
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	41,511	32,915	40,080	15,156	2,769	5,199	5,675	5,819	3,357	3,657	4,907
MRO	A5.1	32,668	24,126	23,466	1,953	1,126	1,849	770	4,629	1,300	610	800
LTRO	A5.2	8,843	8,789	16,615	13,203	1,643	3,350	4,905	1,190	2,057	3,047	4,107
FTRO	A5.3	-	-	-	-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5	0	-	-	-	-	-	-	-	0	-	0
Other Claims on EA Credit Institutions (€)	A6	1	731	580	1,010	1,014	1,121	1,327	2,600	431	11	320
Securities of EA Residents (€)	A7	2,350	2,085	3,728	3,910	4,004	4,194	3,437	2,954	3,270	3,494	4,654
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	45	431	643	580	484	491	1,592	3,544
Other Securities	A7.2	2,350	2,085	3,728	3,865	3,573	3,550	2,856	2,470	2,779	1,902	1,110
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	5,315	18,399	42,168	52,573	68,000	109,438	105,883	103,670	105,220	147,672	187,320
Participating Interest in the ECB	A9.1	10	11	11	16	19	22	25	25	36	36	36
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	87	91	91	101	101	101	101	101	118	118	118
Claims Related to Allocation of € BN	A9.3	-	-	-	-	-	-	-	-	-	-	-
Net claims Arising from Balances of T2	A9.4	5,218	18,298	42,067	52,456	67,881	109,316	105,757	103,545	105,066	147,518	187,166
Items in Course of Settlement	A10	0	-	-	-	-	-	-	-	-	-	0
Other Assets	A11	1,731	2,180	743	2,166	1,642	792	485	430	478	552	584
TOTAL ASSETS		**52,446**	**59,009**	**100,645**	**77,049**	**79,720**	**127,206**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Table XIII: The Balance Sheet of the National Central Bank of Luxembourg (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	1,269	1,414	1,587	1,859	1,936	2,039	2,094	2,199	2,714	2,877	2,990
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	9,742	10,780	45,532	13,489	9,642	51,223	38,479	24,565	16,664	57,237	97,433
Current Accounts	L2.1	9,742	10,780	16,514	7,986	6,436	10,844	18,367	11,580	12,781	35,596	60,290
Deposit Facility	L2.2	-	-	29,018	5,502	2,986	37,036	18,090	7,850	3,883	21,641	37,143
Fixed-Term Deposits	L2.3	-	-	-	-	220	3,343	2,022	5,135	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4	473	434	387	344	348	702	623	576	2,418	2,424	2,758
General government	L4.1	473	434	387	344	348	502	553	576	579	559	843
Other liabilities	L4.2	-	-	-	0	0	200	70	0	1,839	1,865	1,915
Liabilities to non-Euro Area Residents	L5	32	82	1,012	1,174	1,230	1,398	1,672	2,749	527	260	716
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	0	0	-	-	22	0	0	0	0	0	0
Liabilities to non-EA Residents in FC	L7	38	296	58	74	75	188	1,546	1,366	2,109	1,568	1,336
Counterpart of SDR Allocated by IMF	L8	19	18	19	268	285	293	287	276	294	314	314
Intra-Eurosystem Liabilities	L9	39,812	44,786	51,035	58,701	64,975	69,995	74,257	85,327	90,777	92,618	93,600
Items in Course of Settlement	L10	13	0	0	0	0	2	-	-	0	-	0
Other Liabilities	L11	387	525	514	190	210	358	181	119	34	49	36
Provisions	L12	461	471	242	449	516	591	752	1,041	1,184	1,266	1,300
Revaluation Accounts	L13	31	31	84	319	298	233	342	152	186	154	173
Capital and Reserves	L14	161	168	172	175	182	184	185	187	188	190	192
Profit for the Year	L15	7	4	3	7	2	1	2	2	2	2	2
TOTAL LIABILITIES		**52,446**	**59,009**	**100,645**	**77,049**	**79,720**	**127,206**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Table XIV: The Balance Sheet of the National Central Bank of Malta

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1			4	5	4	10	13	13	5	4	3
Claims on non-Euro Residents in Foreign Currency (FC)	A2			251	375	399	387	512	419	519	528	647
Receivables from the IMF	A2.1			57	141	147	162	162	158	155	151	151
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2			194	234	252	225	350	261	364	377	496
Claims on EA residents in FC	A3			435	238	251	277	224	138	106	158	182
Claims on non-Euro Residents in €	A4			260	96	105	182	383	607	837	946	983
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5			454	1,253	1,075	498	378	200	411	115	55
MRO	A5.1			164	319	384	141	-	6	7	-	-
LTRO	A5.2			290	934	686	357	378	194	405	115	55
FTRO	A5.3			0	-	5	-	-	-	-	-	-
Marginal Lending Facility	A5.5			0	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6			164	1	1	15	0	15	0	1	10
Securities of EA Residents (€)	A7			475	626	1,056	1,368	1,305	1,436	1,400	1,477	1,628
Securities Held for Monetary Policy Purposes	A7.1			0	-	119	165	128	90	67	335	739
Other Securities	A7.2			475	626	937	1,203	1,177	1,345	1,333	1,143	890
Claims on the Government	A8			0	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9			47	48	49	50	51	52	53	53	1,072
Participating Interest in the ECB	A9.1			11	12	13	14	15	15	16	16	16
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2			36	36	36	36	36	37	38	38	38
Claims Related to Allocation of € Banknotes	A9.3			0	-	-	-	-	-	-	-	-
Net claims Arising from Balances of T2	A9.4			0	-	-	-	-	-	-	-	-
Items in Course of Settlement	A10			5	5	7	14	6	6	6	9	11
Other Assets	A11			626	597	698	756	730	725	989	1,215	945
TOTAL ASSETS				**2,723**	**3,244**	**3,644**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Table XIV: The Balance Sheet of the National Central Bank of Malta (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1			693	673	701	738	757	803	864	921	957
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2			483	585	501	1,101	1,474	1,144	499	1,457	2,917
Current Accounts	L2.1			474	448	470	432	253	327	257	408	571
Deposit Facility	L2.2			9	137	31	669	621	147	242	1,049	2,346
Fixed-Term Deposits	L2.3			0	-	-	-	600	670	-	-	-
Fine-Tuning Reverse Operations	L2.4			0	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5			0	0	-	1	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3			0	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4			366	398	411	439	297	340	342	343	750
General government	L4.1			362	393	390	421	247	300	297	271	654
Other liabilities	L4.2			4	5	21	18	50	40	45	72	96
Liabilities to non-Euro Area Residents	L5			80	87	97	87	85	2	3	0	0
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6			34	72	97	123	152	61	50	157	155
Liabilities to non-EA Residents in FC	L7			0	0	0	-	0	0	-	-	-
Counterpart of SDR Allocated by IMF	L8			12	104	110	113	111	107	114	121	122
Intra-Eurosystem Liabilities	L9			721	909	1,330	558	291	709	1,930	973	77
Items in Course of Settlement	L10			0	-	-	-	-	-	-	-	-
Other Liabilities	L11			43	98	68	61	54	50	94	75	62
Provisions	L12			5	4	2	1	12	20	35	50	70
Revaluation Accounts	L13			8	17	12	14	18	10	19	12	20
Capital and Reserves	L14			234	253	266	282	301	314	328	345	356
Profit for the Year	L15			42	46	48	42	52	50	48	50	50
TOTAL LIABILITIES				**2,723**	**3,244**	**3,644**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Table XV: The Balance Sheet of the National Central Bank of Netherlands

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	9,947	11,353	12,239	15,090	20,782	23,961	24,834	17,155	19,450	19,164	21,622
Claims on non-Euro Residents in Foreign Currency (FC)	A2	8,081	6,625	8,190	12,445	13,802	15,973	16,414	16,198	16,119	15,993	12,872
Receivables from the IMF	A2.1	1,278	1,203	1,815	6,746	7,544	8,948	8,867	8,216	8,140	8,042	7,235
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	6,803	5,422	6,375	5,699	6,258	7,025	7,547	7,982	7,979	7,951	5,637
Claims on EA residents in FC	A3	877	2,493	14,152	1,329	668	364	152	-	401	231	672
Claims on non-Euro Residents in €	A4	481	643	98	95	28	126	185	243	248	359	1,013
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	11,089	45,961	34,815	37,596	2,569	3,380	24,511	8,814	10,782	13,000	16,552
MRO	A5.1	9,656	27,445	1,200	629	1,654	190	32	-	160	315	20
LTRO	A5.2	1,424	18,516	33,615	36,966	915	3,190	24,479	8,814	10,622	12,685	16,532
FTRO	A5.3	-	-	-	-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	3,425	4,397	5,345	1,612	4,295	4,628	-	100	251	240	302
Securities of EA Residents (€)	A7	4,775	8,611	12,258	13,683	17,450	28,050	26,563	30,176	28,252	56,527	97,100
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	1,632	7,442	14,826	14,778	13,041	11,093	39,517	77,891
Other Securities	A7.2	4,775	8,611	12,258	12,051	10,008	13,224	11,785	17,135	17,159	17,010	19,209
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	20,892	13,759	17,863	37,802	65,789	182,457	153,195	82,791	62,157	102,139	136,801
Participating Interest in the ECB	A9.1	230	235	235	269	336	402	469	469	482	482	482
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	2,223	2,243	2,243	2,297	2,297	2,297	2,297	2,299	2,320	2,320	2,320
Claims Related to Allocation of € Banknotes	A9.3	8,508	11,281	15,385	19,919	22,939	27,278	30,569	34,314	39,907	44,729	47,449
Net claims Arising from Balances of T2	A9.4	9,931	-	-	15,317	40,217	152,480	119,860	45,709	19,448	54,608	86,550
Items in Course of Settlement	A10	-	-	-	-	-	-	-	-	-	-	-
Other Assets	A11	7,639	8,265	9,654	11,587	8,029	7,637	8,538	3,051	2,577	2,783	3,392
TOTAL ASSETS		**67,206**	**102,107**	**114,614**	**131,239**	**133,412**	**266,576**	**254,392**	**158,528**	**140,237**	**210,436**	**290,326**

Table XV: The Balance Sheet of the National Central Bank of Netherlands (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	32,301	34,871	39,203	42,397	44,147	46,600	47,856	50,161	53,505	56,690	58,929
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	13,662	21,528	29,372	57,902	50,000	175,606	158,038	73,938	49,943	114,399	170,959
Current Accounts	L2.1	13,197	20,293	15,636	17,511	17,783	16,126	87,593	37,866	44,418	98,260	143,171
Deposit Facility	L2.2	465	235	13,736	40,391	12,867	131,036	14,370	9,157	5,525	16,139	27,788
Fixed-Term Deposits	L2.3	-	1,000	-	-	19,350	28,444	56,075	26,915	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	-	-	-	-	-	-	-	145
Liabilities to Other EA Residents	L4	33	31	72	93	154	166	134	965	1,862	1,360	1,898
General government	L4.1	11	4	24	26	99	5	7	47	192	85	1,366
Other liabilities	L4.2	22	27	48	67	55	161	127	918	1,670	1,275	532
Liabilities to non-Euro Area Residents	L5	2,909	4,165	6,222	2,218	4,863	6,171	5,873	1,774	587	4,062	21,172
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	-	-	-	-	-	-	-	-	-	-
Liabilities to non-EA Residents in FC	L7	1,296	566	-	-	-	-	-	315	-	-	107
Counterpart of SDR Allocated by IMF	L8	605	570	586	5,265	5,597	5,740	5,638	5,409	5,767	6,156	6,165
Intra-Eurosystem Liabilities	L9	-	21,949	18,814	-	-	-	-	-	-	-	-
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	595	501	463	1,010	893	1,101	4,726	116	595	348	618
Provisions	L12	171	173	457	306	149	73	32	15	22	516	1,016
Revaluation Accounts	L13	9,169	10,659	12,110	14,941	20,365	23,413	24,284	16,846	19,135	18,804	21,347
Capital and Reserves	L14	6,465	7,094	7,315	7,106	7,244	7,707	7,811	7,811	7,870	7,918	7,927
Profit for the Year	L15	-	-	-	-	-	-	-	1,178	951	183	43
TOTAL LIABILITIES		**67,206**	**102,107**	**114,614**	**131,238**	**133,412**	**266,577**	**254,392**	**158,528**	**140,237**	**210,436**	**290,326**

Table XVI: The Balance Sheet of the National Central Bank of Portugal

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	5,937	6,989	7,644	9,425	12,979	14,964	15,509	10,714	12,147	11,968	13,503
Claims on non-Euro Residents in Foreign Currency (FC)	A2	1,548	842	931	1,670	2,732	1,524	1,663	2,013	3,997	5,832	10,374
Receivables from the IMF	A2.1	176	146	207	1,141	1,232	1,263	1,242	1,190	1,234	1,274	1,276
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	1,371	696	725	529	1,500	261	422	823	2,763	4,558	9,098
Claims on EA residents in FC	A3	795	638	7	0	553	332	449	345	351	188	383
Claims on non-Euro Residents in €	A4	2,092	4,044	635	1,694	1,864	694	512	562	354	418	388
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	161	2,464	10,210	16,061	40,899	46,001	52,784	47,864	31,191	26,161	22,372
MRO	A5.1	95	957	5,045	606	17,060	6,976	3,523	5,050	7,750	8,553	1,339
LTRO	A5.2	66	1,507	5,165	15,410	22,975	39,025	49,261	42,694	23,441	17,608	21,033
FTRO	A5.3	-	-	-	-	840	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	-	45	25	-	-	120	-	-	-
Other Claims on EA Credit Institutions (€)	A6	1	0	1	1	0	0	58	44	59	33	28
Securities of EA Residents (€)	A7	6,583	5,331	8,544	8,091	13,556	15,925	14,816	14,019	17,883	29,372	45,418
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	648	4,161	7,269	6,984	6,031	5,272	16,690	32,254
Other Securities	A7.2	6,583	5,331	8,544	7,443	9,395	8,656	7,832	7,988	12,612	12,682	13,165
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	10,842	13,406	16,838	19,130	20,195	23,019	26,347	29,471	33,172	36,315	38,945
Participating Interest in the ECB	A9.1	100	101	101	114	144	173	202	213	204	204	204
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	982	987	987	1,008	1,008	1,008	1,008	1,022	1,010	1,010	1,010
Claims Related to Allocation of € Banknotes	A9.3	9,755	12,305	15,679	17,945	19,043	21,821	25,025	28,198	31,920	35,080	37,636
Net claims Arising from Balances of T2	A9.4	5	13	70	62	-	17	111	38	38	21	95
Items in Course of Settlement	A10	4	0	6	6	2	0	0	3	0	0	0
Other Assets	A11	4,781	4,956	5,860	6,447	6,969	7,308	7,268	6,558	6,454	6,612	6,307
TOTAL ASSETS		**32,745**	**38,670**	**50,676**	**62,524**	**99,750**	**109,768**	**119,406**	**111,592**	**105,608**	**116,899**	**137,717**

Table XVI: The Balance Sheet of the National Central Bank of Portugal (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	14,270	15,346	17,254	18,608	19,376	20,452	21,003	22,303	23,299	24,686	25,661
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	5,049	9,266	5,402	8,771	4,921	5,691	8,136	8,218	3,589	7,712	5,649
Current Accounts	L2.1	5,046	6,116	4,832	4,536	1,861	3,284	3,846	2,667	3,589	7,703	5,498
Deposit Facility	L2.2	3	-	570	4,235	3,051	2,406	4,290	5,535	-	6	150
Fixed-Term Deposits	L2.3	-	3,150	-	-	-	-	-	-	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	10	1		16	-	4	0
Other Liabilities to EA Credit Inst. in €	L3	25	-	-	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents	L4	1	1	1	2	1	4,869	5,484	7,629	7,989	6,630	13,011
General government	L4.1	0	0	0	2	1	4,743	5,223	7,629	7,830	5,593	11,845
Other liabilities	L4.2	1	1	1	0	0	126	260	0	159	1,037	1,165
Liabilities to non-Euro Area Residents	L5	75	8	4	4	0	0	0	0	0	0	0
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	-	-	-	-	-	-	-	-	-	-
Liabilities to non-EA Residents in FC	L7	-	-	-	-	-	-	-	-	-	-	3,398
Counterpart of SDR Allocated by IMF	L8	61	57	59	878	933	957	940	902	962	1,026	1,028
Intra-Eurosystem Liabilities	L9	6,601	6,206	18,953	23,436	59,921	60,964	66,026	59,565	54,638	61,705	71,588
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	377	394	480	360	444	516	355	385	341	303	426
Provisions	L12	2,063	1,984	2,157	2,400	2,519	2,947	3,199	3,322	3,567	4,047	4,247
Revaluation Accounts	L13	2,935	3,971	4,788	6,479	10,055	12,061	12,657	7,758	9,637	9,296	11,027
Capital and Reserves	L14	1,100	1,155	1,230	1,330	1,381	1,278	1,156	1,256	1,282	1,261	1,244
Profit for the Year	L15	188	282	349	254	198	31	449	253	304	233	441
TOTAL LIABILITIES		**32,745**	**38,671**	**50,676**	**62,524**	**99,749**	**109,768**	**119,406**	**111,592**	**105,608**	**116,899**	**137,717**

Table XVII: The Balance Sheet of the National Central Bank of Slovakia

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1				781	1,075	1,240	1,285	888	1,006	992	1,119
Claims on non-Euro Residents in Foreign Currency (FC)	A2				486	538	652	622	671	1,819	1,653	1,885
Receivables from the IMF	A2.1				446	501	605	608	630	609	570	424
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2				40	36	47	14	41	1,210	1,083	1,461
Claims on EA residents in FC	A3				106	112	268	122	36	103	186	273
Claims on non-Euro Residents in €	A4				2,450	2,911	3,090	2,583	2,931	3,905	3,324	2,187
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5				2,063	1,005	1,264	1,942	329	570	661	761
MRO	A5.1				-	-	-	-	27	185	20	25
LTRO	A5.2				2,063	1,005	1,264	1,942	302	385	641	736
FTRO	A5.3				-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5				-	-	-	-	-	0	-	-
Other Claims on EA Credit Institutions (€)	A6				100	49	43	40	33	56	28	23
Securities of EA Residents (€)	A7				10,196	11,039	12,548	9,752	7,727	6,161	8,816	15,080
Securities Held for Monetary Policy Purposes	A7.1				268	1,394	2,416	2,211	1,670	1,358	6,383	13,739
Other Securities	A7.2				9,928	9,645	10,132	7,541	6,057	4,802	2,433	1,341
Claims on the Government	A8				-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9				3,429	2,333	1,476	1,762	3,378	3,973	2,111	1,226
Participating Interest in the ECB	A9.1				194	206	217	229	229	263	263	263
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2				399	399	399	399	399	448	448	448
Claims Related to Allocation of € Banknotes	A9.3				2,836	1,728	859	155	-	966	879	515
Net claims Arising from Balances of T2	A9.4				-	-	-	978	2,750	2,297	521	-
Items in Course of Settlement	A10				-	-	0	-	-	-	-	-
Other Assets	A11				5,784	6,420	6,608	6,595	6,083	5,480	5,330	5,315
TOTAL ASSETS					**25,396**	**25,482**	**27,188**	**24,702**	**22,076**	**23,074**	**23,101**	**27,870**

Table XVII: The Balance Sheet of the National Central Bank of Slovakia (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1				7,481	7,675	8,100	8,318	8,701	10,323	10,937	11,369
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2				1,198	715	646	691	1,285	752	1,496	1,877
Current Accounts	L2.1				521	601	217	634	1,096	652	1,456	1,737
Deposit Facility	L2.2				677	90	429	56	6	100	40	140
Fixed-Term Deposits	L2.3				-	25	-	-	183	-	-	-
Fine-Tuning Reverse Operations	L2.4				-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5				-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3				39	1,050	329	5,635	2,960	4,601	4,768	2,788
Liabilities to Other EA Residents	L4				66	111	160	2,791	2,918	1,229	271	998
General government	L4.1				0	0	1	2,607	2,723	1,001	0	744
Other liabilities	L4.2				66	111	159	184	195	227	271	253
Liabilities to non-Euro Area Residents	L5				370	278	1,494	3,519	3,059	2,943	1,838	1,571
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6				79	86	90	90	116	397	1,011	913
Liabilities to non-EA Residents in FC	L7				57	62	65	65	63	261	468	860
Counterpart of SDR Allocated by IMF	L8				371	394	404	397	381	406	433	434
Intra-Eurosystem Liabilities	L9				14,500	13,306	13,600	-	76	-	-	5,042
Items in Course of Settlement	L10				-	-	-	-	-	-	-	-
Other Liabilities	L11				503	896	1,169	1,172	778	659	417	338
Provisions	L12				5	5	8	257	305	525	665	638
Revaluation Accounts	L13				298	544	765	1,210	588	519	434	537
Capital and Reserves	L14				358	358	358	358	358	358	358	358
Profit for the Year	L15				71	-	-	199	490	102	5	147
TOTAL LIABILITIES					**25,396**	**25,482**	**27,188**	**24,702**	**22,076**	**23,075**	**23,101**	**27,870**

Table XVIII: The Balance Sheet of the National Central Bank of Slovenia

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1		58	64	78	108	125	129	89	101	100	112
Claims on non-Euro Residents in Foreign Currency (FC)	A2		657	618	672	692	641	592	578	734	685	591
Receivables from the IMF	A2.1		26	42	262	315	388	388	369	392	367	361
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2		632	576	411	376	253	204	209	343	318	231
Claims on EA residents in FC	A3		498	262	245	259	246	269	209	139	220	260
Claims on non-Euro Residents in €	A4		1,083	1,140	878	768	786	782	784	1,022	1,059	1,217
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5		156	1,198	2,115	602	1,740	3,982	3,337	1,098	901	714
MRO	A5.1		80	134	1	53	53	125	-	-	-	15
LTRO	A5.2		76	2,114	1,064	539	1,687	3,857	3,337	1,098	901	699
FTRO	A5.3		-	-	-	10	-	-	-	-	-	-
Marginal Lending Facility	A5.5		-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6		972	636	20	95	289	49	379	230	51	201
Securities of EA Residents (€)	A7		2,103	2,442	2,942	3,096	3,444	3,774	2,995	2,552	4,999	8,274
Securities Held for Monetary Policy Purposes	A7.1		-	-	85	669	1,165	1,098	727	677	2,979	6,469
Other Securities	A7.2		2,103	2,442	2,857	2,428	2,279	1,676	2,269	1,875	2,021	1,804
Claims on the Government	A8		-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9		2,576	2,637	2,752	2,728	2,736	2,839	2,216	4,774	1,948	956
Participating Interest in the ECB	A9.1		55	55	58	64	69	75	75	82	82	82
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2		184	184	189	189	189	189	190	200	200	200
Claims Related to Allocation of € Banknotes	A9.3		2,335	2,398	2,505	2,474	2,477	2,575	1,951	2,088	1,407	673
Net claims Arising from Balances of T2	A9.4		2	-	-	-	-	-	-	2,404	259	-
Items in Course of Settlement	A10		-	-	-	-	-	-	-	-	-	-
Other Assets	A11		257	329	285	214	211	227	226	204	291	340
TOTAL ASSETS			**8,360**	**9,324**	**9,987**	**8,561**	**10,218**	**12,643**	**10,813**	**10,854**	**10,254**	**12,666**

Table XVIII: The Balance Sheet of the National Central Bank of Slovenia (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1		2,900	3,215	3,496	3,640	3,843	3,947	4,136	4,615	4,892	5,085
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2		356	984	1,220	882	1,126	1,320	2,068	1,434	1,627	2,249
Current Accounts	L2.1		335	403	415	442	393	1,313	1,464	1,434	1,627	2,249
Deposit Facility	L2.2		16	582	805	305	602	7	-	-	-	-
Fixed-Term Deposits	L2.3		5	-	-	135	130	-	605	-	-	-
Fine-Tuning Reverse Operations	L2.4		-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5		-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3		53	10	14	14	15	18	14	8	4	3
Liabilities to Other EA Residents	L4		392	309	300	288	890	1,039	1,756	2,847	1,743	2,018
General government	L4.1		341	268	271	270	872	1,023	1,714	2,718	1,730	1,949
Other liabilities	L4.2		51	42	29	18	18	16	42	129	13	69
Liabilities to non-Euro Area Residents	L5		70	33	16	33	21	12	15	10	16	20
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6		66	72	69	76	71	75	73	94	60	78
Liabilities to non-EA Residents in FC	L7		-	-	-	-	-	-	-	-	-	-
Counterpart of SDR Allocated by IMF	L8		27	28	235	250	256	252	241	257	275	275
Intra-Eurosystem Liabilities	L9		3,491	3,556	3,334	2,093	2,728	4,409	1,024	-	-	1,223
Items in Course of Settlement	L10		-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11		158	202	190	113	108	109	96	114	155	147
Provisions	L12		30	62	119	144	149	330	402	409	423	457
Revaluation Accounts	L13		18	101	167	188	163	156	69	116	122	151
Capital and Reserves	L14		800	752	724	802	831	844	866	874	882	903
Profit for the Year	L15		-	-	104	38	17	132	50	75	54	57
TOTAL LIABILITIES			**8,360**	**9,324**	**9,987**	**8,561**	**10,218**	**12,643**	**10,813**	**10,854**	**10,254**	**12,666**

Table XIX: The Balance Sheet of the National Central Bank of Spain

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	6,467	5,145	5,627	6,938	9,555	11,017	11,418	7,888	8,943	8,811	9,941
Claims on non-Euro Residents in Foreign Currency (FC)	A2	3,856	7,498	8,379	12,307	14,040	25,020	26,593	25,612	32,296	40,577	49,834
Receivables from the IMF	A2.1	674	590	868	4,119	4,782	5,804	5,908	5,593	5,434	5,205	5,423
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	3,181	6,909	7,511	8,188	9,258	19,216	20,685	20,019	26,862	35,372	44,411
Claims on EA residents in FC	A3	1,177	2,579	8,941	0	0	4,251	2,577	2,175	2,800	3,858	4,934
Claims on non-Euro Residents in €	A4	913	4,974	2,929	1,015	907	844	813	402	307	306	-
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	21,866	71,374	92,577	90,088	61,550	168,196	361,087	195,170	143,889	135,353	146,006
MRO	A5.1	18,696	57,248	22,169	658	20,285	11,422	45,735	17,107	21,579	11,679	1,818
LTRO	A5.2	3,170	14,123	70,285	89,421	39,663	156,678	315,352	178,064	122,307	123,674	144,188
FTRO	A5.3	-	-	-	-	1,585	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	63	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	2	2	2	1,152	2	3	1	4	2	2	0
Securities of EA Residents (€)	A7	29,396	69,697	75,904	84,341	87,828	106,386	96,931	88,212	88,238	161,097	255,931
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	3,400	13,907	31,080	32,990	29,586	26,498	109,421	219,836
Other Securities	A7.2	29,396	69,697	75,904	80,940	73,921	75,306	63,941	58,626	61,741	51,677	36,095
Claims on the Government	A8	7,416	5,832	5,249	4,665	4,082	3,499	2,915	1,943	972	-	-
Intra-Eurosystem Claims	A9	29,835	4,787	4,787	13,121	20,946	32,178	40,078	53,105	76,686	90,153	104,406
Participating Interest in the ECB	A9.1	433	438	438	663	802	940	1,079	1,078	1,313	1,313	1,313
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	4,327	4,349	4,349	4,784	4,784	4,784	4,784	4,783	5,123	5,123	5,123
Claims Related to Allocation of € Banknotes	A9.3	-	-	-	7,674	15,360	26,454	34,216	47,244	70,250	83,718	97,970
Net claims Arising from Balances of T2	A9.4	25,075	-	-	-	-	-	-	-	-	-	-
Items in Course of Settlement	A10	3	1	1	0	1	1	1	2	1	2	1
Other Assets	A11	36,880	3,340	4,593	4,324	3,709	4,173	7,269	6,458	5,188	4,693	5,946
TOTAL ASSETS		**137,811**	**175,229**	**208,988**	**217,952**	**202,621**	**355,567**	**549,683**	**380,972**	**359,322**	**444,853**	**577,000**

Table XIX: The Balance Sheet of the National Central Bank of Spain (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	62,865	67,613	76,018	88,274	91,918	97,025	99,641	104,377	118,152	125,190	130,134
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	20,559	52,321	54,315	35,089	26,964	50,934	72,005	30,783	17,851	27,839	55,226
Current Accounts	L2.1	20,558	38,327	24,136	24,736	19,950	14,561	12,852	15,950	12,631	21,239	44,220
Deposit Facility	L2.2	-	215	30,106	10,352	6,998	33,335	59,047	14,833	5,220	6,600	11,000
Fixed-Term Deposits	L2.3	-	13,775	-	-	-	3,000	-	-	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	1	3	72	1	17	37	106	1	0	-	6
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	0	0	0	110	1	0	210	0
Liabilities to Other EA Residents	L4	17,503	20,356	20,545	32,726	9,489	5,570	10,952	4,164	434	466	20,000
General government	L4.1	15,057	18,030	18,771	31,233	9,337	5,426	9,010	2,117	58	122	17,818
Other liabilities	L4.2	2,446	2,325	1,774	1,493	152	144	1,942	2,048	376	344	2,182
Liabilities to non-Euro Area Residents	L5	127	158	172	264	400	381	142	145	520	83	2,232
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	2	1	1	1	1	1	1	1	1	1	1
Liabilities to non-EA Residents in FC	L7	154	117	72	1	1	1	1	1	1	1	1
Counterpart of SDR Allocated by IMF	L8	341	321	330	3,078	3,272	3,355	3,296	3,162	3,372	3,599	3,604
Intra-Eurosystem Liabilities	L9	24,114	21,142	42,047	41,034	50,864	174,826	336,831	213,382	189,718	254,103	327,733
Items in Course of Settlement	L10	206	240	247	104	138	240	184	1,679	22	29	199
Other Liabilities	L11	548	579	492	376	300	506	351	176	129	184	365
Provisions	L12	2,652	4,006	4,848	5,312	5,479	6,365	7,806	9,014	10,185	11,667	14,620
Revaluation Accounts	L13	5,294	4,371	5,812	7,020	9,275	12,012	12,569	9,039	14,518	17,312	19,360
Capital and Reserves	L14	1,500	2,000	2,000	2,000	1,950	1,950	1,950	1,900	1,900	1,900	1,900
Profit for the Year	L15	1,948	2,005	2,090	2,673	2,570	2,400	3,845	3,148	2,519	2,270	1,625
TOTAL LIABILITIES		**137,811**	**175,229**	**208,988**	**217,951**	**202,621**	**355,567**	**549,683**	**380,972**	**359,322**	**444,853**	**577,000**

Table XX: The Balance Sheet of the European Central Bank

Assets	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Receivables	A1	9,930	10,280	10,664	12,355	17,016	19,644	20,359	14,064	15,980	15,795	17,820
Claims on non-Euro Residents in Foreign Currency (FC)	A2	29,728	29,022	41,611	35,456	39,714	41,428	41,323	39,391	44,400	49,745	51,137
Receivables from the IMF	A2.1	415	450	347	346	415	664	653	627	669	715	716
Balances with Banks & Security Investments External Loans and Other External Assets	A2.2	29,313	28,573	41,264	35,110	39,299	40,763	40,670	38,764	43,731	49,030	50,421
Claims on EA residents in FC	A3	2,774	3,868	22,226	3,294	4,327	4,828	2,838	1,271	1,784	1,863	2,473
Claims on non-Euro Residents in €	A4	4	25	629	-	1,800	1,456	-	535	-	-	-
Lending to EA Credit Institutions re Monetary Policy Operations in €	A5	-	-	-	-	-	-	-	-	-	-	-
MRO	A5.1	-	-	-	-	-	-	-	-	-	-	-
LTRO	A5.2	-	-	-	-	-	-	-	-	-	-	-
FTRO	A5.3	-	-	-	-	-	-	-	-	-	-	-
Marginal Lending Facility	A5.5	-	-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions (€)	A6	0	100	0	0	33	205	0	0	2	53	99
Securities of EA Residents (€)	A7	-	-	-	2,182	17,926	22,819	22,056	18,160	17,788	77,809	160,815
Securities Held for Monetary Policy Purposes	A7.1	-	-	-	2,182	17,926	22,819	22,056	18,160	17,788	77,809	160,815
Other Securities	A7.2	-	-	-	-	-	-	-	-	-	-	-
Claims on the Government	A8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Claims	A9	53,805	71,372	295,117	70,873	67,176	120,483	97,681	76,495	81,323	86,674	90,097
Participating Interest in the ECB	A9.1	-	-	-	-	-	-	-	-	-	-	-
Claims Arising from the Transfer of Foreign Reserves to the ECB	A9.2	-	-	-	-	-	-	-	-	-	-	-
Claims Related to Allocation of € Banknotes	A9.3	50,259	54,131	61,022	64,513	67,176	71,090	73,007	76,495	81,323	86,674	90,097
Net claims Arising from Balances of T2	A9.4	3,546	17,241	234,096	6,360	-	49,393	24,674	-	-	-	-
Items in Course of Settlement	A10	-	-	-	-	-	-	-	-	-	-	-
Other Assets	A11	9,525	11,376	13,656	13,838	15,532	20,009	23,036	24,259	24,013	24,707	26,543
TOTAL ASSETS		**105,766**	**126,043**	**383,903**	**137,998**	**163,523**	**230,871**	**207,292**	**174,175**	**185,291**	**256,645**	**348,984**

Table XX: The Balance Sheet of the European Central Bank (continued)

Liabilities	€mn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes in Circulation	L1	50,259	54,131	61,022	64,513	67,176	71,090	73,007	76,495	81,323	86,674	90,097
Liabilities to Euro Area Credit Institutions re. Monetary Policy Operations in €	L2	-	-	-	-	-	-	-	-	-	-	1,852
Current Accounts	L2.1	-	-	-	-	-	-	-	-	-	-	-
Deposit Facility	L2.2	-	-	-	-	-	-	-	-	-	-	-
Fixed-Term Deposits	L2.3	-	-	-	-	-	-	-	-	-	-	-
Fine-Tuning Reverse Operations	L2.4	-	-	-	-	-	-	-	-	-	-	-
Deposits related to Margin Calls	L2.5	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities to EA Credit Inst. in €	L3	-	-	-	-	33	205	-	-	-	-	-
Liabilities to Other EA Residents	L4	1,065	1,050	1,020	1,056	1,072	1,056	1,024	1,054	1,020	1,026	1,060
Other liabilities	L4.2	1,065	1,050	1,020	1,056	1,072	1,056	1,024	1,054	1,020	1,026	1,060
Liabilities to non-Euro Area Residents	L5	105	14,571	253,931	9,515	1,202	77,117	50,888	24,766	900	2,331	16,731
Liabilities to Euro Area Residents in Foreign Currency (FC)	L6	-	-	273	-	-	-	-	-	-	-	-
Liabilities to non-EA Residents in FC	L7	331	667	1,445	19	478	407	-	18	458	-	-
Counterpart of SDR Allocated by IMF	L8	-	-	-	-	-	-	-	-	-	-	-
Intra-Eurosystem Liabilities	L9	39,782	40,042	40,150	40,204	61,430	40,308	40,308	40,430	64,133	123,876	191,994
Items in Course of Settlement	L10	-	-	-	-	-	-	-	-	-	-	-
Other Liabilities	L11	2,162	2,593	5,213	1,337	1,812	2,744	2,490	1,342	1,144	1,380	1,985
Provisions	L12	2,394	2,694	4,039	4,043	5,217	6,408	7,595	7,620	7,689	7,703	7,706
Revaluation Accounts	L13	5,578	6,169	11,353	10,915	19,627	24,325	23,335	13,358	19,938	24,833	28,626
Capital and Reserves	L14	4,089	4,127	4,137	4,142	5,306	6,484	7,650	7,653	7,697	7,740	7,740
Profit for the Year	L15	-	-	1,322	2,253	171	728	995	1,440	989	1,082	1,193
TOTAL LIABILITIES		**105,766**	**126,043**	**383,903**	**137,998**	**163,523**	**230,871**	**207,292**	**174,175**	**185,291**	**256,645**	**348,984**

Appendix 3.2

Subscribed Capital of the ECB
Euro Area NCBs

€mn	2006	2007	2008	2009	2010	2011-2012	2013 (Jul)	2014	2015-2016
Euro Area NCBs									
AT	115,745	116,129	116,129	111,855	208,940	208,940	209,680	212,506	212,506
BE	141,910	142,334	142,334	139,730	261,010	261,010	261,705	268,222	268.222
CY			7,195	7,886	14,731	14,731	14,430	16,378	16,378
EE						19,262	19,269	20,871	20,871
FI	71,712	71,709	71,709	72,233	134,928	134,928	134,836	136,005	136,006
FR	827,533	828,814	828,814	819,234	1,530,294	1,530,294	1,530,028	1,534,899	1,534,899
DE	1,176,171	1,182,149	1,182,149	1,090,912	2,037,777	2,037,777	2,030,804	1,948,209	1,948,208
GR	105,584	104,660	104,660	113,192	211,436	211,436	210,904	220,094	220,094
IE	51,301	51,183	51,183	63,984	119,519	119,519	120,277	125,646	125,646
IT	726,278	721,792	721,792	719,886	1,344,716	1,344,716	1,348,471	1,332,645	1,332,645
LV								30,537	30,537
LT									44,729
LU	8,725	9,073	9,073	10,064	18,799	18,799	18,825	21,975	21,975
MT			3,583	3,641	6,801	6,801	6,874	7,015	7,015
NL	222,336	224,303	224,303	229,746	429,156	429,156	429,352	433,379	433,379
PT	98,233	98,720	98,720	100,834	188,354	188,354	190,910	188,723	188,723
SK				39,944	74,614	74,614	74,487	83,623	83,623
SI		18,400	18,400	18,941	35,381	35,381	35,398	37,400	37,400
ES	432,698	434,918	434,918	478,365	893,565	893,565	893,420	957,028	957,028
	3,978,227	**4,004,183**	**4,014,962**	**4,020,446**	**7,510,021**	**7,529,282**	**7,529,669**	**7,575,156**	**7,619,885**

Appendix 3.2 (cont.)

Subscribed Capital of the ECB
Non-Euro Area NCBs

€mn	2006	2007	2008	2009	2010	2011-2012	2013 (Jul)	2014	2015-2016
Non-Euro Area NCB									
BG		50,884	50,884	50,037	93,467	93,467	93,571	92,987	92,987
HR							64,355	65,199	65,199
CY	7,234	7,195							
CZ	81,155	79,958	79,958	83,368	155,728	155,728	157,385	174,012	174,012
DK	87,159	87,205	87,205	85,459	159,634	159,634	159,712	161,000	161,000
EE	9,927	9,810	9,810	10,312	19,262				
HU	77,260	75,701	75,701	79,820	149,100	149,100	148,736	149,363	149,363
LV	16,572	16,205	16,205	16,343	30,528	30,528	29,682		
LT	24,624	24,068	24,068	24,517	45,797	45,797	44,307	44,729	
MT	3,600	3,583							
PL	285,913	280,820	280,820	282,007	526,777	526,777	525,890	554,565	554,565
RO		145,099	145,099	141,971	265,196	265,196	264,661	281,710	281,710
SK	39,771	38,971	38,971						
SI	18,614								
SE	134,292	134,298	134,298	130,087	242,997	242,997	244,775	246,042	246,042
UK	800,322	802,672	802,672	836,285	1,562,145	1,562,145	1,562,265	1,480,244	1,480,244
	1,586,443	**1,756,469**	**1,745,691**	**1,740,207**	**3,250,632**	**3,231,370**	**3,295,338**	**3,249,851**	**3,205,122**
EA and Non-EA NCBs	**5,564,669**	**5,760,652**	**5,760,652**	**5,760,652**	**10,760,652**	**10,760,652**	**10,825,007**	**10,825,007**	**10,825,007**

Appendix 3.3

Fully Paid-Up Capital of the ECB
Euro Area NCBs

€mn	2006	2007	2008	2009	2010	2011	2012	2013 (Jul)	2014	2015-2016
Euro Area NCBs										
AT	115,745	116,129	116,129	111,855	144,216	176,578	208,940	209,680	212,506	212,506
BE	141,910	142,334	142,334	139,730	180,157	220,584	261,010	261,705	268,222	268.222
CY			7,195	7,886	10,168	12,450	14,731	14,430	16,378	16,378
EE						16,278	19,262	19,269	20,871	20,871
FI	71,712	71,709	71,709	72,233	93,131	114,029	134,928	134,836	136,005	136,006
FR	827,533	828,814	828,814	819,234	1,056,254	1,293,274	1,530,294	1,530,028	1,534,899	1,534,899
DE	1,176,171	1,182,149	1,182,149	1,090,912	1,406,534	1,722,155	2,037,777	2,030,804	1,948,209	1,948,208
GR	105,584	104,660	104,660	113,192	145,939	178,688	211,436	210,904	220,094	220,094
IE	51,301	51,183	51,183	63,984	82,495	101,007	119,519	120,277	125,646	125,646
IT	726,278	721,792	721,792	719,886	928,162	1,136,439	1,344,716	1,348,471	1,332,645	1,332,645
LV									30,537	30,537
LT										44,729
LU	8,725	9,073	9,073	10,064	12,976	15,887	18,799	18,825	21,975	21,975
MT			3,583	3,641	4,694	5,747	6,801	6,874	7,015	7,015
NL	222,336	224,303	224,303	229,746	296,216	362,686	429,156	429,352	433,379	433,379
PT	98,233	98,720	98,720	100,834	130,008	159,181	188,354	190,910	188,723	188,723
SK				39,944	51,501	63,058	74,614	74,487	83,623	83,623
SI		18,400	18,400	18,941	24,421	29,901	35,381	35,398	37,400	37,400
ES	432,698	434,918	434,918	478,365	616,765	755,165	893,565	893,420	136,005	957,028
	3,978,227	**4,004,183**	**4,014,962**	**4,020,446**	**5,183,637**	**6,363,107**	**7,529,282**	**7,529,669**	**7,575,156**	**7,619,885**

Appendix 3.3 (cont.)

Fully Paid-Up Capital of the ECB
Non-Euro Area NCBs

€mn	2006	2007	2008	2009	2010	2011	2012	2013 (Jul)	2014	2015-2016
Non-Euro Area NCBs										
BG		3,562	3,562	3,503	3,505	3,505	3,505	3,509	3,487	3,487
HR								2,413	2,445	2,445
CY	506	504								
CZ	5,681	5,597	5,597	5,836	5,840	5,840	5,840	5,902	6,525	6,525
DK	6,101	6,104	6,104	5,982	5,986	5,986	5.986	5,989	6,038	6,038
EE	695	687	687	722	722					
HU	5,408	5,299	5,299	5,588	5,591	5,591	5,591	5,578	5,601	5,601
LV	1,160	1,134	1,134	1,144	1,145	1,145	1,145	1,113		
LT	1,724	1,685	1,685	1,716	1,717	1,717	1,717	1,662	1,677	
MT	252	251								
PL	20,014	19,657	19,657	19,740	19,754	19,754	19,754	19,721	20,796	20,796
RO		10,157	10,157	9,938	9,945	9,945	9,945	9,925	10,564	10,564
SK	2,784	2,728	2,728							
SI	1,303									
SE	9,400	9,401	9,401	9,107	9,112	9,112	9,112	9,179	9,227	9,227
UK	56,023	56,187	56,187	58,540	58,580	58,580	58,580	58,585	55,509	55,509
	111,051	**122,953**	**122,198**	**121,814**	**121,899**	**121,176**	**121,176**	**123,576**	**121,869**	**120,192**
EA and Non-EA NCBs	**4,089,278**	**4,127,136**	**4,137,159**	**4,142,260**	**5,305,536**	**6,484,284**	**7,650,459**	**7,653,244**	**7,697,025**	**7,740,077**

Appendices to Chapter 4

Appendix 4.1: Financial Statement of the Eurosystem^ (ESTA) – 2006-2016

Assets (€bn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gold and Gold Rec.	176.8	201.5	217.7	266.9	367.4	423.5	438.7	302.9	343.6	338.7	382.1
Claims on non-€ Res. (FC)	142.5	139.1	160.5	200.2	228.8	247.7	258.5	239.6	270.4	306.8	329.4
Claims on EA Res. (FC)	23.5	42.1	252.9	27.8	22.4	95.5	25.2	22.4	27.9	31.8	29.5
Claims on non-€ Res. in €	12.6	18.7	18.8	15.3	22.7	25.4	19.1	20.1	18.9	20.3	19.1
Lending to EA Credit Inst. re MPO in €	450.6	637.4	860.8	750.4	546.8	863.7	1,127.5	753.1	630.5	559.1	595.9
MRO	330.5	368.6	239.5	79.2	227.1	144.8	89.7	168.7	156.1	89.0	39.1
LTRO	120.0	268.5	617.7	668.3	299.0	703.9	1,035.8	583.3	473.3	469.5	556.6
FTRO	-	-	-	-	20.6	-	-	-	-	-	-
MLF	0.1	0.1	4.1	1.3	0.0	14.8	0.6	0.3	0.9	0.5	0.2
Other Claims on EA Credit Inst. (€)	11.1	23.9	57.1	26.3	45.7	173.0	202.8	74.8	59.9	107.9	65.4
Securities of EA Res. in €	79.5	139.3	272.4	329.9	459.1	621.1	588.4	592.1	592.2	1,164.0	1,979.2
Securities MP	-	-	-	28.8	135.3	273.9	278.2	236.8	218.0	805.0	1,643.5
Other Sec.	79.5	139.3	272.4	301.1	323.8	347.3	309.3	355.3	374.2	359.0	320.6
Claims on Gov.	39.4	37.1	37.4	36.2	35.0	33.9	30.0	28.3	26.7	25.1	26.5
Intra-Claims	301.9	383.7	676.4	592.0	755.9	1,171.5	1,333.1	1,073.4	1,042.8	1,289.5	1,559.4
Items in Course of Settlement	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1
Other Assets	213.5	268.6	214.4	249.3	274.3	249.6	272.8	240.1	238.2	227.5	234.9
TOTAL ASSETS	1,451.4	1,891.5	2,768.7	2,494.4	2,758.0	3,905.0	4,296.1	3,347.0	3,251.3	4,070.7	5,221.3

^A financial statement of the greater institution of the Eurosystem referred to as the "Mega-ECB" compiled as the summation of all the EANCBs and the ECB.

Source: Annual Reports of the National Central Banks and the ECB; own computation;

Financial Statement of the Eurosystem (ESTA) – 2006-2016 (continued)

Liabilities €bn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banknotes	628.2	676.7	762.9	806.5	839.7	888.7	912.6	956.2	1,016.6	1,083.5	1,126.2
Liabilities to EA Credit Inst. re. MPO in €	174.1	379.3	492.4	395.7	378.1	849.5	925.4	473.2	366.5	768.3	1,315.1
CA	173.5	267.4	291.8	233.5	212.8	223.6	447.1	282.6	318.2	555.8	873.7
Deposits	0.6	8.8	177.4	162.2	93.5	362.6	195.6	57.4	34.1	125.6	271.2
FT Deposits	-	78.6	-	-	60.0	144.4	196.7	94.3	-	-	-
Dep re. MC	0.0	0.0	0.1	-	0.0	1.1	0.5	0.1	0.0	0.1	0.1
Other Liabilities to EA Credit Inst. in €	0.1	0.1	0.3	0.3	2.8	2.4	6.7	3.0	4.6	5.2	7.5
Liabilities to other EA Res. in €	53.4	46.2	91.1	129.7	79.8	79.7	135.7	91.2	64.1	141.9	220.8
Liabilities to non-EA Res.in €	16.7	45.2	293.7	46.8	47.7	156.9	184.5	115.4	48.3	54.6	205.7
Liabilities to EA Residents in FC	7.7	12.0	27.7	10.8	13.9	11.0	6.9	5.7	2.6	3.6	3.9
Liabilities to non-EA Res. FC	5.2	6.0	6.7	2.9	2.5	2.6	3.0	1.9	3.7	2.9	9.0
Counterpart of SDR by the IMF	5.5	5.3	5.5	51.3	54.5	55.9	55.0	52.7	56.2	59.2	59.3
Intra-ES Liabilities	297.0	378.5	671.3	586.9	749.6	1,164.0	1,324.5	1,064.8	1,033.9	1,280.4	1,550.3
Items in Course of Settlement	0.7	0.9	0.7	0.5	0.4	0.5	0.5	1.8	0.2	0.2	0.4
Other Liabilities	41.8	87.9	111.5	117.3	107.4	140.0	148.5	121.0	122.2	116.2	109.6
Provisions	35.1	35.5	44.1	44.8	49.4	59.5	76.6	81.5	86.2	91.3	101.2
Revaluation A/C	121.9	147.2	175.8	220.3	331.7	394.2	407.4	262.8	331.5	346.0	394.6
Capital & Reserves	55.8	60.9	71.5	64.5	90.9	92.2	95.0	97.5	100.6	104.4	106.4
Profit	8.3	9.7	13.6	16.2	9.8	7.8	13.8	18.1	13.9	13.0	11.1
TOTAL LIABILITIES	1,451.4	1,891.5	2,768.7	2,494.4	2,758.0	3,905.0	4,296.1	3,347.0	3,251.3	4,070.7	5,221.2

Appendix 4.2

Actual and Implied Total Assets

€bn		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual TA	56.5	65.6	94.9	75.5	84.3	105.8	115.1	102.3	98.0	114.1	132.3
	Implied TA	42.2	54.9	80.1	69.4	76.7	108.4	119.2	93.2	91.2	113.5	145.6
	Ratio of Actual to Implied TA	**1.3**	**1.2**	**1.2**	**1.1**	**1.1**	**1.0**	**1.0**	**1.1**	**1.1**	**1.0**	**0.9**
BE	Actual TA	86.5	116.8	166.8	106.3	80.4	135.7	116.9	83.9	82.1	98.0	143.5
	Implied TA	51.8	67.2	98.2	86.7	95.9	135.4	148.9	116.3	115.1	143.3	183.8
	Ratio of Actual to Implied TA	**1.7**	**1.7**	**1.7**	**1.2**	**0.8**	**1.0**	**0.8**	**0.7**	**0.7**	**0.7**	**0.8**
CY	Actual TA			11.4	13.7	12.2	15.6	15.5	14.6	12.1	12.6	14.6
	Implied TA			5.0	4.9	5.4	7.6	8.4	6.4	7.0	8.7	11.2
	Ratio of Actual to Implied TA			**2.3**	**2.8**	**2.3**	**2.0**	**1.8**	**2.3**	**1.7**	**1.4**	**1.3**
EE	Actual TA						3.7	4.8	4.7	6.5	7.4	7.7
	Implied TA						10.0	11.0	8.6	9.0	11.1	14.3
	Ratio of Actual to Implied TA						**0.4**	**0.4**	**0.6**	**0.7**	**0.7**	**0.5**
FI	Actual TA	21.7	25.1	36.9	38.1	48.9	102.3	104.9	52.9	51.0	62.0	85.7
	Implied TA	26.2	33.9	49.4	44.8	49.6	70.0	77.0	59.9	58.4	72.7	93.2
	Ratio of Actual to Implied TA	**0.8**	**0.7**	**0.7**	**0.9**	**1.0**	**1.5**	**1.4**	**0.9**	**0.9**	**0.9**	**0.9**
FR	Actual TA	254.2	386.8	632.3	534.2	514.9	756.2	773.9	585.4	615.3	762.1	915.7
	Implied TA	301.9	391.5	571.5	508.3	562.0	793.7	873.2	680.1	658.8	820.0	1,051.7
	Ratio of Actual to Implied TA	**0.8**	**1.0**	**1.1**	**1.1**	**0.9**	**1.0**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**
DE	Actual TA	404.8	520.9	725.6	625.5	715.6	900.1	1,081.4	848.0	818.5	1,077.6	1,482.2
	Implied TA	429.1	558.4	815.2	676.8	748.4	1,056.9	1,162.7	902.7	836.2	1,040.8	1,334.9
	Ratio of Actual to Implied TA	**0.9**	**0.9**	**0.9**	**0.9**	**1.0**	**0.9**	**0.9**	**0.9**	**1.0**	**1.0**	**1.1**
GR	Actual TA	37.7	46.0	80.9	90.5	143.2	174.9	165.6	114.4	108.5	170.9	152.5
	Implied TA	38.5	49.4	72.2	70.2	77.6	109.7	120.6	93.7	94.5	117.6	150.8
	Ratio of Actual to Implied TA	**1.0**	**0.9**	**1.1**	**1.3**	**1.8**	**1.6**	**1.4**	**1.2**	**1.1**	**1.5**	**1.0**
IE	Actual TA	41.6	55.1	121.0	127.1	207.1	179.9	140.8	110.9	84.4	81.5	88.5
	Implied TA	18.7	24.2	35.3	39.7	43.9	62.0	68.2	53.5	53.9	67.1	86.1
	Ratio of Actual to Implied TA	**2.2**	**2.3**	**3.4**	**3.2**	**4.7**	**2.9**	**2.1**	**2.1**	**1.6**	**1.2**	**1.0**
IT	Actual TA	237.9	267.1	336.4	326.0	362.2	580.2	647.0	585.6	563.2	632.3	834.7
	Implied TA	265.0	341.0	497.7	446.6	493.8	697.4	767.3	599.4	572.0	711.9	913.1
	Ratio of Actual to Implied TA	**0.9**	**0.8**	**0.7**	**0.7**	**0.7**	**0.8**	**0.8**	**1.0**	**1.0**	**0.9**	**0.9**

Actual and Implied Total Assets (cont.)

€bn		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
MT	Actual TA				3.4	3.8	3.8	3.8	3.8	4.5	4.7	5.9
	Implied TA			2.5	2.3	2.5	3.5	3.9	3.1	3.0	3.7	4.8
	Ratio of Actual to Implied TA			**1.2**	**1.5**	**1.5**	**1.1**	**1.0**	**1.2**	**1.5**	**1.3**	**1.2**
NL	Actual TA	73.1	109.2	136.1	139.1	142.8	279.7	266.2	168.5	150.8	225.0	310.2
	Implied TA	81.1	106.0	154.7	142.5	157.6	222.6	244.9	190.8	186.0	231.5	297.0
	Ratio of Actual to Implied TA	**0.9**	**1.0**	**0.9**	**1.0**	**0.9**	**1.3**	**1.1**	**0.9**	**0.8**	**1.0**	**1.0**
PT	Actual TA	35.4	41.8	60.1	66.0	103.9	115.5	124.6	116.0	110.2	123.3	
	Implied TA	35.8	46.6	68.1	62.6	69.2	97.7	107.5	84.9	81.0	100.8	129.3
	Ratio of Actual to Implied TA	**1.0**	**0.9**	**0.9**	**1.1**	**1.5**	**1.2**	**1.2**	**1.4**	**1.4**	**1.2**	**1.1**
SK	Actual TA				26.8	27.1	29.5	26.8	23.8	25.1	25.9	31.7
	Implied TA				24.8	27.4	38.7	42.6	33.1	35.9	44.7	57.3
	Ratio of Actual to Implied TA				**1.1**	**1.0**	**0.8**	**0.6**	**0.7**	**0.7**	**0.6**	**0.6**
SI	Actual TA		8.9	11.1	10.6	9.3	11.3	13.6	11.6	11.8	11.5	14.4
	Implied TA		8.7	12.7	11.8	13.0	18.3	20.2	15.7	16.1	20.0	25.6
	Ratio of Actual to Implied TA		**1.0**	**0.9**	**0.9**	**0.7**	**0.6**	**0.7**	**0.7**	**0.7**	**0.6**	**0.6**
ES	Actual TA	149.3	188.9	250.6	234.4	222.1	383.0	574.3	401.6	382.7	477.1	620.8
	Implied TA	157.9	205.4	299.9	296.8	328.2	463.4	509.9	397.1	410.8	511.3	655.8
	Ratio of Actual to Implied TA	**0.9**	**0.9**	**0.8**	**0.8**	**0.7**	**0.8**	**1.1**	**1.0**	**0.9**	**0.9**	**0.9**

Appendix 4.3

Actual and Implied Total Assets excluding Intra-Eurosystem Claims

€bn		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual TA – intra ES claims	37.9	43.6	71.5	55.3	56.3	68.3	69.1	56.7	65.7	82.1	99.5
	Implied TA – intra ES claims	33.4	43.7	60.5	52.9	55.7	75.9	82.2	63.3	62.0	77.6	102.1
	Ratio of Actual to Implied TA	1.1	1.0	1.2	1.0	1.0	0.9	0.8	0.9	1.1	1.1	1.0
BE	Actual TA – intra ES claims	60.8	88.8	132.0	83.6	58.0	113.6	98.2	67.0	64.8	81.4	128.9
	Implied TA – intra ES claims	41.0	53.6	74.2	66.1	69.6	94.8	102.7	79.0	78.2	97.9	128.9
	Ratio of Actual to Implied TA	1.5	1.7	1.8	1.3	0.8	1.2	1.0	0.8	0.8	0.8	1.0
CY	Actual TA – intra ES claims			10.6	13.3	11.7	14.7	14.3	14.4	11.8	9.5	7.3
	Implied TA – intra ES claims			3.7	3.7	3.9	5.3	5.8	4.4	4.8	6.0	7.9
	Ratio of Actual to Implied TA			2.8	3.6	3.0	2.8	2.5	3.3	2.5	1.6	0.9
EE	Actual TA – intra ES claims						1.1	1.2	1.1	1.3	2.6	4.7
	Implied TA – intra ES claims						7.0	7.6	5.8	6.1	7.6	10.0
	Ratio of Actual to Implied TA						0.2	0.2	0.2	0.2	0.3	0.5
FI	Actual TA – intra ES claims	14.9	16.3	21.4	22.6	23.8	29.8	28.8	24.9	25.0	35.3	57.5
	Implied TA – intra ES claims	20.7	27.0	37.4	34.2	36.0	49.0	53.1	40.7	39.7	49.6	65.4
	Ratio of Actual to Implied TA	0.7	0.6	0.6	0.7	0.7	0.6	0.5	0.6	0.6	0.7	0.9
FR	Actual TA – intra ES claims	159.5	295.3	486.0	435.6	415.3	644.1	668.9	482.9	507.5	646.7	798.7
	Implied TA – intra ES claims	239.1	312.1	431.9	387.6	408.0	555.6	602.2	462.0	447.5	560.3	737.6
	Ratio of Actual to Implied TA	0.7	0.9	1.1	1.1	1.0	1.2	1.1	1.0	1.1	1.2	1.1
DE	Actual TA – intra ES claims	370.6	415.9	510.2	416.6	359.6	391.6	387.1	304.0	324.6	458.5	692.3
	Implied TA – intra ES claims	339.8	445.1	616.0	516.2	543.3	739.8	801.9	613.2	568.0	711.1	936.2
	Ratio of Actual to Implied TA	1.1	0.9	0.8	0.8	0.7	0.5	0.5	0.5	0.6	0.6	0.7
GR	Actual TA – intra ES claims	34.9	42.6	71.8	86.9	139.8	169.9	161.0	110.5	104.4	166.6	148.0
	Implied TA – intra ES claims	30.5	39.4	54.5	53.6	56.4	76.8	83.2	63.7	64.2	80.3	105.8
	Ratio of Actual to Implied TA	1.1	1.1	1.3	1.6	2.5	2.2	1.9	1.7	1.6	2.1	1.4
IE	Actual TA – intra ES claims	40.4	53.7	116.7	125.2	205.2	177.2	138.3	108.8	82.1	79.2	86.2
	Implied TA – intra ES claims	14.8	19.3	26.7	30.3	31.9	43.4	47.0	36.3	36.6	45.9	60.4
	Ratio of Actual to Implied TA	2.7	2.8	4.4	4.1	6.4	4.1	2.9	3.0	2.2	1.7	1.4

Actual and Implied Total Assets excluding Intra-Eurosystem Claims (cont.)

€bn		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
IT	Actual TA – intra ES claims	197.2	210.5	252.0	250.1	338.4	550.3	617.4	550.4	518.1	576.8	775.2
	Implied TA – intra ES claims	209.9	271.8	376.1	340.6	358.5	488.2	529.2	407.2	388.5	486.4	640.4
	Ratio of Actual to Implied TA	0.9	0.8	0.7	0.7	0.9	1.1	1.2	1.4	1.3	1.2	1.2
MT	Actual TA – intra ES claims			2.7	3.3	3.7	3.6	3.7	3.6	4.4	4.6	4.7
	Implied TA – intra ES claims			1.9	1.7	1.8	2.5	2.7	2.1	2.0	2.6	3.4
	Ratio of Actual to Implied TA			1.5	1.9	2.0	1.5	1.4	1.8	2.1	1.8	1.4
NL	Actual TA – intra ES claims	49.2	91.4	101.7	97.3	73.1	90.4	107.4	81.3	84.0	118.0	168.2
	Implied TA – intra ES claims	64.2	84.5	116.9	108.7	114.4	155.8	168.9	129.6	126.4	158.2	208.3
	Ratio of Actual to Implied TA	0.8	1.1	0.9	0.9	0.6	0.6	0.6	0.6	0.7	0.7	0.8
PT	Actual TA – intra ES claims	23.2	26.6	36.0	45.1	82.0	89.5	95.8	84.6	75.0	84.8	105.2
	Implied TA – intra ES claims	28.4	37.2	51.4	47.7	50.2	68.4	74.1	57.6	55.0	68.9	90.7
	Ratio of Actual to Implied TA	0.8	0.7	0.7	0.9	1.6	1.3	1.3	1.5	1.4	1.2	1.2
SK	Actual TA – intra ES claims				22.6	24.1	26.8	24.0	19.7	20.2	22.9	29.5
	Implied TA – intra ES claims				18.9	19.9	27.1	29.4	22.5	24.4	30.5	40.2
	Ratio of Actual to Implied TA				1.2	1.2	1.0	0.8	0.9	0.8	0.7	0.7
SI	Actual TA – intra ES claims		6.0	7.1	7.6	6.3	8.0	10.3	9.1	6.6	9.1	13.0
	Implied TA – intra ES claims		6.9	9.6	9.0	9.4	12.8	13.9	10.7	10.9	13.7	18.0
	Ratio of Actual to Implied TA		0.9	0.7	0.8	0.7	0.6	0.7	0.8	0.6	0.7	0.7
LT	Actual TA – intra ES claims										7.8	11.9
	Implied TA – intra ES claims										16.3	21.5
	Ratio of Actual to Implied TA										0.5	0.6
LV	Actual TA – intra ES claims									5.1	8.0	11.6
	Implied TA – intra ES claims									8.9	11.1	14.7
	Ratio of Actual to Implied TA									0.6	0.7	0.8
ES	Actual TA – intra ES claims	113.6	176.4	213.8	212.8	193.1	336.5	522.6	339.5	295.8	376.0	505.1
	Implied TA – intra ES claims	125.0	163.8	226.6	226.3	238.2	324.4	351.6	269.8	279.0	349.3	459.9
	Ratio of Actual to Implied TA	0.9	1.1	0.9	0.9	0.8	1.0	1.5	1.3	1.1	1.1	1.1

The Actual Share of ESTA excluding intra ES claims and the Adjusted Capital Key

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	Actual Share of TA – intra ES Claims	3.3	2.9	3.4	2.9	2.8	2.5	2.3	2.5	3.0	3.0	2.7
	Adjusted Capital Key	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
BE	Actual Share of TA – intra ES Claims	5.3	5.9	6.3	4.4	2.9	4.2	3.3	2.9	2.9	2.9	3.5
	Adjusted Capital Key	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
CY	Actual Share of TA – intra ES Claims			0.5	0.7	0.6	0.5	0.5	0.6	0.5	0.3	0.2
	Adjusted Capital Key			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
EE	Actual Share of TA – intra ES Claims						0.0	0.0	0.0	0.1	0.1	0.1
	Adjusted Capital Key						0.3	0.3	0.3	0.3	0.3	0.3
FI	Actual Share of TA – intra ES Claims	1.3	1.1	1.0	1.2	1.2	1.1	1.0	1.1	1.1	1.3	1.6
	Adjusted Capital Key	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
FR	Actual Share of TA – intra ES Claims	13.9	19.6	23.2	22.9	20.7	23.6	22.6	21.2	23.0	23.3	21.8
	Adjusted Capital Key	20.8	20.7	20.6	20.4	20.4	20.3	20.3	20.3	20.3	20.1	20.1
DE	Actual Share of TA – intra ES Claims	32.2	27.6	24.4	21.9	18.0	14.3	13.1	13.4	14.7	16.5	18.9
	Adjusted Capital Key	29.6	29.5	29.4	27.1	27.1	27.1	27.1	27.0	25.7	25.6	25.6
GR	Actual Share of TA – intra ES Claims	3.0	2.8	3.4	4.6	7.0	6.2	5.4	4.9	4.7	6.0	4.0
	Adjusted Capital Key	2.7	2.6	2.6	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9
IE	Actual Share of TA – intra ES Claims	3.5	3.6	5.6	6.6	10.3	6.5	4.7	4.8	3.7	2.8	2.4
	Adjusted Capital Key	1.3	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.7	1.6	1.6

The Actual Share of ESTA excluding intra ES claims and the Adjusted Capital Key (cont.)

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
IT	Actual Share of TA – intra ES Claims	17.2	14.0	12.0	13.1	16.9	20.1	20.8	24.2	23.5	20.7	21.2
	Adjusted Capital Key	18.3	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.6	17.5	17.5
MT	Actual Share of TA – intra ES Claims			0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1
	Adjusted Capital Key			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NL	Actual Share of TA – intra ES Claims	4.3	6.1	4.9	5.1	3.7	3.3	3.6	3.6	3.8	4.2	4.6
	Adjusted Capital Key	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
PT	Actual Share of TA – intra ES Claims	2.0	1.8	1.7	2.4	4.1	3.3	3.2	3.7	3.4	3.0	2.9
	Adjusted Capital Key	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
SK	Actual Share of TA – intra ES Claims				1.2	1.2	1.0	0.8	0.9	0.9	0.8	0.8
	Adjusted Capital Key				1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
SI	Actual Share of TA – intra ES Claims		0.4	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.4
	Adjusted Capital Key		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
LT	Actual Share of TA – intra ES Claims										0.3	0.3
	Adjusted Capital Key										0.6	0.6
LV	Actual Share of TA – intra ES Claims									0.2	0.3	0.3
	Adjusted Capital Key									0.4	0.4	0.4
ES	Actual Share of TA – intra ES Claims	9.9	11.7	10.2	11.2	9.6	12.3	17.6	14.9	13.4	13.5	13.8
	Adjusted Capital Key	10.9	10.9	10.8	11.9	11.9	11.9	11.9	11.9	12.6	12.6	12.6

Appendix 4.4 Conventional Loss Absorption Capacity

Capital and Reserves

€bn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.3
Belgium	2.1	2.2	2.4	2.7	3.9	4.1	4.3	4.6	4.9	5.2	5.5
Cyprus			0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3
Estonia						0.3	0.4	0.4	0.4	0.4	0.4
Finland	1.6	1.7	1.9	2.0	2.2	2.3	2.3	2.4	2.5	2.5	2.6
France	11.2	13.3	20.5	12.1	34.4	32.7	32.9	33.5	34.6	36.1	36.5
Germany	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.6
Greece	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Ireland	1.1	1.2	1.3	1.5	1.7	1.9	2.1	2.4	2.7	3.3	3.6
Italy	16.8	17.3	19.6	20.1	21.1	21.7	22.6	23.5	24.3	25.0	25.3
Latvia									0.5	0.5	0.5
Lithuania										0.4	0.4
Luxembourg	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Malta			0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
Netherlands	6.5	7.1	7.3	7.1	7.2	7.7	7.8	7.8	7.9	7.9	7.9
Portugal	1.1	1.2	1.2	1.3	1.4	1.3	1.2	1.3	1.3	1.3	1.2
Slovakia				0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Slovenia		0.8	0.8	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9
Spain	1.5	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9
ECB	4.1	4.1	4.1	4.1	5.3	6.5	7.7	7.7	7.7	7.7	7.7
Eurosystem	55.8	60.9	71.5	64.5	90.9	92.2	95.0	97.5	100.6	104.4	106.4

Capital and Reserves plus Revaluation Accounts

€bn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	7.3	7.7	8.6	9.9	12.9	14.6	15.3	11.0	12.8	12.4	14.0
Belgium	5.3	6.1	7.1	8.2	11.6	13.1	13.7	11.0	12.3	12.7	13.9
Cyprus			0.4	0.4	0.6	0.7	0.7	0.6	0.7	0.7	0.7
Estonia						0.4	0.4	0.4	0.4	0.4	0.5
Finland	2.4	2.6	3.5	3.7	4.4	5.1	4.9	4.0	4.8	5.3	5.5
France	32.8	40.9	52.4	55.0	102.3	114.4	117.9	85.5	99.9	104.5	115.8
Germany	50.9	60.0	68.1	81.8	115.5	134.4	137.6	93.1	109.5	110.7	125.2
Greece	1.3	1.7	2.0	2.7	4.1	4.9	5.1	3.2	3.9	3.9	4.5
Ireland	1.2	1.3	1.6	1.7	2.0	2.2	2.4	5.7	12.3	14.1	14.5
Italy	40.2	47.3	53.5	65.0	91.4	104.7	109.5	77.7	90.5	93.0	103.5
Latvia									0.5	0.5	0.5
Lithuania										0.6	0.7
Luxembourg	0.2	0.2	0.3	0.5	0.5	0.4	0.5	0.3	0.4	0.3	0.4
Malta			0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
Netherlands	15.6	17.8	19.4	22.0	27.6	31.1	32.1	24.7	27.0	26.7	29.3
Portugal	4.0	5.1	6.0	7.8	11.4	13.3	13.8	9.0	10.9	10.6	12.3
Slovakia				0.7	0.9	1.1	1.6	0.9	0.9	0.8	0.9
Slovenia		0.8	0.9	0.9	1.0	1.0	1.0	0.9	1.0	1.0	1.1
Spain	6.8	6.4	7.8	9.0	11.2	14.0	14.5	10.9	16.4	19.2	21.3
ECB	9.7	10.3	15.5	15.1	24.9	30.8	31.0	21.0	27.6	32.6	36.4
Eurosystem	177.8	208.1	247.3	284.7	422.5	486.5	502.5	360.3	432.1	450.3	501.0

Capital and Reserves, Revaluation Accounts plus Provisions

€bn	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	9.8	10.5	11.6	13.4	16.6	18.6	20.1	16.0	18.2	18.2	19.9
Belgium	6.2	7.1	8.2	8.3	11.6	13.1	13.8	11.0	12.3	12.7	13.9
Cyprus			0.5	0.6	0.8	0.9	1.1	0.8	1.1	1.0	1.0
Estonia						0.4	0.4	0.4	0.5	0.5	0.5
Finland	5.0	4.9	5.6	6.0	7.3	8.1	8.6	7.9	9.0	9.6	10.0
France	33.4	41.5	54.4	56.6	103.5	115.4	118.9	86.4	100.9	105.4	116.7
Germany	56.3	65.2	75.1	88.3	123.5	146.5	156.5	112.3	129.2	130.3	147.1
Greece	2.4	2.9	3.5	4.7	6.5	8.8	11.3	9.8	10.6	11.1	12.0
Ireland	1.2	1.3	1.6	1.8	2.0	2.5	2.9	6.1	12.6	14.3	14.8
Italy	54.5	60.2	68.8	80.8	108.3	123.0	130.8	101.1	115.4	119.5	133.1
Latvia									0.5	0.5	0.5
Lithuania										0.7	0.8
Luxembourg	0.7	0.7	0.5	0.9	1.0	1.0	1.3	1.4	1.6	1.6	1.7
Malta			0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
Netherlands	15.8	17.9	19.9	22.4	27.8	31.2	32.1	24.7	27.0	27.2	30.3
Portugal	6.1	7.1	8.2	10.2	14.0	16.3	17.0	12.3	14.5	14.6	16.5
Slovakia				0.7	0.9	1.1	1.8	1.3	1.4	1.5	1.5
Slovenia		0.8	0.9	1.0	1.1	1.1	1.3	1.3	1.4	1.4	1.5
Spain	9.4	10.4	12.7	14.3	16.7	20.3	22.3	20.0	26.6	30.9	35.9
ECB	12.1	13.0	19.5	19.1	30.1	37.2	38.6	28.6	35.3	40.3	44.1
Eurosystem	212.9	243.6	291.4	329.6	471.9	545.9	579.1	441.8	518.3	541.6	602.2

Appendix to Chapter 5

Appendix 5.1

Estimations Results when Luxembourg is included in the panel of EA countries

As noted in Chapter 5, the bivariate relationship between Actual Total Assets and Implied Total Assets is clear-cut across the cross-section of all the 19 Euro Area countries except for one outlier – Luxembourg. Being a country with distinctive characteristics, Luxembourg was excluded from the balanced panel used for the analysis in Chapter 5. In view of this, this Appendix replicates the econometric analysis carried out in Chapter 5 but also includes Luxembourg in order to capture whether excluding an outlier has any significant impact on the results.

When Luxembourg is included in the analysis, in the case of the three ECM versions considered (Models 2, 3 and 4), the Mean Group estimate of the adjustment coefficient ranges between 30 per cent and 45 per cent as compared to the range of 32 per cent and 43 per cent in the case when Luxembourg is excluded from the analysis. In the case of the PAM (Model 5), the speed of adjustment varies from 82 per cent when Luxembourg is excluded to 85 per cent with a panel of 12 Euro Area countries. In the case of Model 8, Model 9 and Model 10, the speed of adjustment, which was already relatively slow, is slower when Luxembourg is included (around 5 per cent as compared to 17 per cent). Both AIC and BIC confirm that Model 10 remains the most preferred model when Luxembourg is included in the panel of countries under analysis. Therefore, one can conclude that there is only a minimal impact on the econometric results when Luxembourg is included in the analysis.

Appendix Table 5.1 presents a summary of the results while Appendix Tables 5.2 to 5.9 present the detailed results.

Appendix Table 5.1 Summary Table:
The Effect on the Estimation Results when Luxembourg is included in the Analysis

	Speed of Adjustment	
	Excluding Luxembourg	Including Luxembourg
Model 1	53.0	58.7
Model 2	36.7	42.4
Model 3	42.7	45.1
Model 4	32.3	29.7
Model 5	81.8	85.0
Model 6	72.1	69.6
Model 7	70.9	69.3
Model 8	17.3	0.05
Model 9	14,6	0.03
Model 10	14.7	0.03

Appendix Table 5.2 Country-Specific Estimates based on ARDL (1,1) Specification

Model 1: $a_{it} = \alpha_{o_i} + \delta_{1_i} b_{it} + \delta_{2_i} b_{i,t-1} + \delta_{3_i} a_{i,t-1} + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\delta_1}$	$\widehat{\delta_2}$	$\widehat{\delta_3}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	4.6433 (1.5668)	0.6989 (0.0859)	0.2845 (0.3236)	-0.3829 (0.4110)	0.0432	0.9578
Belgium	3.3378 (3.5958)	1.3426 (0.3212)	-1.2170 (0.2795)	0.5756 (0.2376)	0.1483	0.6514
Finland	-2.3391 (2.7892)	1.5612 (0.3770)	-0.9371 (0.6261)	0.5833 (0.3540)	0.1951	0.8239
France	2.2857 (0.8854)	0.9987 (0.1092)	-0.5188 (0.2526)	0.3454 (0.2256)	0.0573	0.9475
Germany	-1.0137 (1.1696)	0.9469 (0.1299)	-0.8269 (0.4330)	0.9561 (0.4611)	0.0634	0.9557
Greece	1.5436 (3.6231)	0.8703 (0.4794)	-0.5801 (0.6822)	0.5836 (0.4995)	0.2246	0.7195
Ireland	5.7625 (2.8973)	0.3987 (0.6052)	-0.7427 (0.5598)	0.8203 (0.2453)	0.2792	0.5043
Italy	-2.6440 (1.0159)	0.8918 (0.1230)	-0.2820 (0.2014)	0.5865 (0.1738)	0.0638	0.9712
Netherlands	-1.3605 (1.7786)	1.4069 (0.2498)	-0.3774 (0.4546)	0.0778 (0.3562)	0.1288	0.8732
Portugal	-0.3163 (2.1996)	0.5312 (0.2902)	0.0061 (0.3848)	0.5037 (0.3259)	0.1299	0.8955
Spain	-2.4396 (1.6839)	1.2198 (0.3057)	-0.5559 (0.5494)	0.5210 (0.3620)	0.1325	0.8989
Luxembourg	3.9998 (1.8514)	1.0974 (0.2372)	0.0160 (0.3798)	-0.2131 (0.3726)	0.1170	0.8940

Appendix Table 5.3 Country-Specific Estimates based on ARDL (1,1) Specification

Model 2: $\Delta a_{it} = \alpha_{0_i} + \delta_{1_i}\Delta b_{it} + \lambda_i(b_{i,t-1} - a_{i,t-1}) + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\delta_1}$	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	0.0065 (0.0284)	0.8267 (0.1078)	0.2548 (0.2231)	0.0628	0.8690
Belgium	-0.1373 (0.0558)	1.5447 (0.2427)	0.2317 (0.1287)	0.1476	0.8145
Finland	-0.0655 (0.0722)	1.4496 (0.3428)	0.2709 (0.2980)	0.1904	0.7288
France	-0.0505 (0.0334)	1.1479 (0.1272)	0.6090 (0.3061)	0.0780	0.9074
Germany	0.0342 (0.0402)	0.8786 (0.1037)	-0.0636 (0.4389)	0.0625	0.9047
Greece	0.1381 (0.1179)	0.9776 (0.3671)	0.5535 (0.3311)	0.2105	0.4949
Ireland	-0.0391 (0.2775)	1.0392 (0.6160)	0.0504 (0.2834)	0.3343	0.0860
Italy	-0.0205 (0.0540)	0.7222 (0.1401)	0.3016 (0.2265)	0.0859	0.7417
Netherlands	-0.0586 (0.0482)	1.3167 (0.2100)	0.8585 (0.3338)	0.1244	0.8519
Portugal	0.1398 (0.0540)	0.4911 (0.2013)	0.4504 (0.2221)	0.1207	0.4527
Spain	-0.0620 (0.0619)	1.0165 (0.2882)	0.5210 (0.3856)	0.1416	0.7217
Luxembourg	2.6870 (0.7833)	1.1772 (0.2086)	1.0532 (0.3039)	0.1138	0.7945

Appendix Table 5.4 Mean Group Estimators for Model 1 to Model 5

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
$\hat{\alpha}$	0.9550	0.9533	0.2143	0.2476	0.2086	0.2349			0.9906	1.3045
$\widehat{\delta_1}$	0.9970	0.1111	1.0490	0.0957						
$\widehat{\delta_2}$	-0.4776	0.1374								
$\widehat{\delta_3}$	0.4131	0.1257								
$\widehat{\lambda\theta}$									0.7811	0.1464
$\hat{\lambda}$			0.4243	0.1012	0.4513	0.0995	0.2970	0.0738	0.8497	0.0862
Goodness-of-fit statistics for dynamic models										
SER	0.1490		0.1577		0.1598		0.1612		0.1670	
$\bar{R}^2$	0.9732		0.6364		0.0792		0.1497		0.5925	
BIC	0.4344		0.2235		-0.0950		-0.4386		0.3374	
Akaike	-0.6806		-0.6128		-0.6525		-0.7174		-0.4988	

Appendix Table 5.5 Country-Specific Estimates based on ARDL (1,1) Specification

Model 3: $\Delta a_{it} - \Delta b_{it} = \alpha_{0i} + \lambda_i(b_{i,t-1} - a_{i,t-1}) + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	-0.0031 (0.0304)	0.3823 (0.2282)	0.0687	0.1671
Belgium	-0.0695 (0.0575)	0.1954 (0.1566)	0.1810	0.0583
Finland	-0.0193 (0.0658)	0.4302 (0.2841)	0.1987	0.1255
France	-0.0342 (0.0310)	0.6464 (0.3110)	0.0797	0.2695
Germany	0.0068 (0.0334)	0.1466 (0.4097)	0.0639	-0.1073
Greece	0.1346 (0.0963)	0.5516 (0.3084)	0.1970	0.1963
Ireland	-0.0346 (0.2509)	0.0487 (0.2640)	0.3128	-0.1202
Italy	-0.0584 (0.0590)	0.3201 (0.2646)	0.1004	0.0490
Netherlands	-0.0211 (0.0444)	0.9520 (0.3532)	0.1340	0.4104
Portugal	0.0796 (0.0627)	0.4878 (0.2867)	01562	0.1740
Spain	-0.0609 (0.0551)	0.5320 (0.3126)	0.1325	0.1741
Luxembourg	2.5599 (0.7553)	0.9937 (0.2905)	0.1118	0.5432

Appendix Table 5.6 Country-Specific Estimates based on ARDL (1,1) Specification

Model 4: $\Delta a_{it} - \Delta b_{it} = \lambda_i (b_{i,t-1} - a_{i,t-1}) + u_{it}$

Country	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	0.3987 (0.1541)	0.0648	0.2586
Belgium	0.2129 (0.1599)	0.1856	0.0099
Finland	0.4056 (0.2573)	0.1884	0.2144
France	0.4463 (0.2557)	0.0807	0.2518
Germany	0.2126 (0.2342)	0.0604	0.0107
Greece	0.2230 (0.2097)	0.2071	0.1113
Ireland	0.0822 (0.0983)	0.2953	0.0019
Italy	0.0995 (0.1422)	0.1003	0.0513
Netherlands	0.9019 (0.3222)	0.1281	0.4612
Portugal	0.2637 (0.2332)	0.1614	0.1182
Spain	0.3077 (0.2405)	0.1341	0.1539
Luxembourg	0.0103 (0.0200)	0.1645	0.0109

Appendix Table 5.7 Country-Specific Estimates based on ARDL (1,1) Specification

Model 5: $\Delta a_{it} = \alpha_{1i} + \lambda_i \theta_i b_{it} - \lambda_i a_{i,t-1} + u_{it}$

Country	$\widehat{\alpha_0}$	$\widehat{\lambda\theta}$	$\widehat{\lambda_i}$	$\hat{\sigma}$	$\bar{R}^2$
Austria	3.4065 (0.6782)	0.7368 (0.0731)	1.0302 (0.0875)	0.0425	0.9399
Belgium	9.0151 (6.3273)	0.1546 (0.3201)	0.9315 (0.3911)	0.2800	0.3324
Finland	-4.2855 (2.6772)	1.2584 (0.3452)	0.8710 (0.1976)	0.2117	0.6647
France	2.3268 (1.0695)	0.9062 (0.1202)	1.0850 (0.1009)	0.0693	0.9270
Germany	-1.7319 (1.3001)	1.0258 (0.1445)	0.9016 (0.1224)	0.0744	0.8649
Greece	-0.1999 (2.9273)	0.8014 (0.4630)	0.7649 (0.2798)	0.2201	0.4479
Ireland	6.7856 (2.9406)	-0.2946 (0.3214)	0.3048 (0.2384)	0.2940	0.2933
Italy	-3.0496 (1.0383)	0.8460 (0.1265)	0.6215 (0.0962)	0.0681	0.8378
Netherlands	-1.7135 (1.6882)	1.3200 (0.2217)	1.1832 (0.1639)	0.1259	0.8485
Portugal	-0.2964 (1.6719)	0.5312 (0.2687)	0.4921 (0.1698)	0.1203	0.4566
Spain	-2.3130 (1.6821)	0.9851 (0.1994)	0.8105 (0.1542)	0.1327	0.7555
Luxembourg	3.9431 (1.1692)	1.1027 (0.1850)	1.200 (0.1896)	0.1083	0.8137

Appendix Table 5.8 Fixed Effects Estimators: Model 6 and Model 7

	Model 6 One-way Fixed Effects		Model 7 Two-way Fixed Effects		
	Coeff.	S.E.	Coeff.	S.E.	
$\widehat{\delta_1}$	1.0107	0.0895	0.5077	0.6136	
$\widehat{\delta_2}$	-0.7603	0.1075	-0.7965	0.5741	
$\widehat{\delta_3}$	0.6963	0.0740	0.6927	0.0769	
$\widehat{\alpha_0}$			7.1173	4.3067	
			FE (cross)	FE (period)	
$\widehat{\alpha_0}$ – AT	0.5913	0.5685	-0.3280	2	-0.3683
$\widehat{\alpha_0}$ – BE	0.5476	0.5791	-0.2518	3	-0.1014
$\widehat{\alpha_0}$ – FI	0.5670	0.5456	-0.5970	4	-0.1357
$\widehat{\alpha_0}$ – FR	0.6931	0.6656	0.8487	5	-0.0420
$\widehat{\alpha_0}$ – DE	0.7200	0.6797	1.0309	6	0.1336
$\widehat{\alpha_0}$ – GR	0.6762	0.5691	-0.2458	7	0.1342
$\widehat{\alpha_0}$ – IE	0.7560	0.5462	-0.4877	8	0.0432
$\widehat{\alpha_0}$ – IT	0.6450	0.6585	0.7272	9	-0.0164
$\widehat{\alpha_0}$ – NL	0.6423	0.6027	0.1049	10	0.1190
$\widehat{\alpha_0}$ – PT	0.6498	0.5629	-0.3341	11	0.2337
$\widehat{\alpha_0}$ – ES	0.6428	0.6387	0.5045		
$\widehat{\alpha_0}$ – LU	1.2398	0.5000	-0.9719		
Goodness-of-fit statistics for dynamic models					
SER	0.1605		0.1626		
$\bar{R}^2$	0.9689		0.9681		
BIC	-0.35556		-0.0616		
Akaike	-0.7040		-0.6191		

Appendix Table 5.9 Pooled OLS Estimators: Model 8 to Model 10

	Model 8		Model 9		Model 10	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
$\widehat{\alpha_0}$	0.1663	0.2117	-0.0034	0.0161		
$\widehat{\delta_1}$	1.0497	0.0815				
$\widehat{\delta_2}$	-1.0135	0.0841				
$\widehat{\delta_3}$	0.9492	0.0293				
$\hat{\lambda}$			0.0318	0.0196	0.0332	0.0183
Goodness-of-fit statistics for dynamic models						
SER	0.1659		0.1654		0.1648	
$\bar{R}^2$	0.9668		0.0136		0.0215	
BIC	-0.6294		-0.6976		-0.7371	
Akaike	-0.7223		-0.7440		-0.7603	

Appendices to Chapter 6

Appendix 6.1

Further Details on the Methodological Approach: an Indicator-Based Typology

As discussed in Chapter 6, an analysis of the central bank balance sheet based merely on size-indicators stops short of providing a proper investigation of the central bank's operational strategies: rather a more comprehensive analysis that focus on the relative distribution of central bank assets and liabilities is required. This is conducted through the computation of a set of balance sheet indicators that summarize central bank balance sheet configuration. This is deemed useful as it allows the classification of EANCBs on the basis of the composition of their assets and liabilities using only a limited number of parameters. Moreover, the use of balance sheet ratios enables the assessment of relative changes in balance sheet composition through time as well as relative differences between EANCBs.

Chapter 6 introduced and applied two frameworks to the EANCBs: the Pattipeilohy's Framework and a new proposed framework – the FEANCB. The application of these two frameworks classified the national central banks by the composition of their assets and liabilities by employing an indicator-based methodology. As the content of Chapter 6 focused more on the outcome of these frameworks and only skimmed through the adopted approach to derive the outcome, this Appendix provides details on the methodology, which consists of a set of balance sheet ratios and a corresponding classification scheme for each framework.

The approach to apply the new Framework for Euro Area National Central Banks consists of classifying the balance sheet items into main categories as defined in Table 6.2. In short, the assets are classified into foreign exchange reserves (A_{FX}), domestic

assets (A_{DOM}) and Cross-Border Assets (A_{CB}). On the liabilities side, there are three main categories: banknotes in circulation (L_B), Liabilities to Domestic Institutions (L_{DOM}) and Cross-Border Liabilities (L_{CB}). A number of balance sheet ratios are calculated to apply the classification rules presented in Appendix Table 6.1.1 (Column 2). The intuition behind these rules is explained in Column 3. Based on these classification rules, each EANCB is classified as either a Foreign Exchange Holder (FXH), Domestic Assets Holder (DAH) or Intra-Eurosystem Lender (IEL) with respect to the asset side of its balance sheet (Column 1). Each EANCB is also classified

Appendix Table 6.1.1 A Taxonomy of Central Bank Balance Sheets Classification Scheme for the Framework for Euro Area National Central Banks (FEANCB)

Category (1)	Classification Rule (2)	Explanation (3)
Assets		
Foreign Exchange Holder (FXH)	$A_{FX} > (A_{CB} + A_{DOM})$	More than half of central bank assets are foreign exchange reserves
Domestic Assets Holder (DAH)	$(A_{CB} + A_{DOM}) > A_{FX}$ and $A_{DOM} > A_{CB}$	More than half of central bank assets are Euro-denominated assets. Of Euro-denominated assets more than half consist of domestic activity
Intra-Eurosystem Lender (IEL)	$(A_{CB} + A_{DOM}) > A_{FX}$ and $A_{CB} > A_{DOM}$	More than half of central bank assets are Euro-denominated assets. Of Euro-denominated assets more than half consist of intra-Euro Area cross-border activity
Liabilities		
Note Issuer (NI)	$L_B > (L_{CB} + L_{DOM})$	Total reserves[83] at the central bank are less than banknotes in circulation
Banker for Domestic Counterparties (BDM)	$L_B < (L_{CB} + L_{DOM})$ and $L_{DOM} > L_{CB}$	Total reserves at the central bank are more than banknotes in circulation. Of total reserves, more than half is associated with domestic activity.
Intra-Eurosystem Borrowers (IEB)	$L_B < (L_{CB} + L_{DOM})$ and $L_{CB} > L_{DOM}$	Total reserves at the central bank are more than banknotes in circulation. Of total reserves, more than half is associated with Intra-Euro Area cross-border activity.

Source: own compilation

[83] Total reserves are defined as total liabilities other than equity and banknotes in circulation.

on the basis of the composition of its liabilities side as being either a Note Issuer (NI), Banker for Domestic Counterparties (BDM) or Intra-Eurosystem Borrower (IEB).

As an example, an EANCB which is classified as a cross-border lender has the majority of its assets (apart from foreign exchange reserves) coming from cross-border activity. In this vein, the purchase by the Bundesbank of securities issued by the Italian government under the Asset Purchase Programme gives rise to cross-border activity on the Bundesbank balance sheet. Similarly, the Bundesbank may hold positions (under item 7.2 in its balance sheet) of euro-denominated securities issued by residents of any other Euro Area Member State such as sovereign Italian bonds. This gives rise to cross-border activity of the Bundesbank balance sheet. In

Appendix Table 6.1.2 A Taxonomy of Central Bank Balance Sheets Slightly Modified Pattipeilohy's Classification Scheme

Category (1)	Classification Rule (2)	Explanation (3)
Assets		
Foreign Exchange Holder (FX)	FX > (G + L)	More than half of central bank assets are foreign exchange reserves
Treasuries Holder (TH)	(G + L) > FX and G > L	More than half of central bank assets are domestic assets. Of domestic assets more than half has domestic government as counterparty/issuer
Private Sector Lender (PSL)	(G + L) > FX and L > G	More than half of central bank assets are domestic assets. Of domestic assets more than half has domestic private sector as counterparty/issuer
Liabilities		
Note Issuer (NI)	Bn > (Rg + Rs)^	Total deposits at central bank are less than banknotes in circulation
Government's Banker (GB)	Bn < (Rg + Rs)^ and Rg > Rs	Total deposits at central bank are more than banknotes in circulation. Of total deposits, more than half is associated with domestic government.
Bankers' Bank (BB)	Bn < (Rg + Rs)^ and Rs > Rg	Total deposits at central bank are more than banknotes in circulation. Of total deposits, more than half is associated with domestic banking sector.

^These classification rules are different from those in Pattipeilohy (2016). In the latter study, these rules are Bn > 10(Rg + Rs) for the first category and Bn < 10(Rg + Rs) for the second and third category.
Source: Based on Pattipeilohy (2016)

both of these cases, A_{CB} will increase and if it exceeds A_{DOM}, then the Bundesbank will be classified as an Intra-Eurosystem Lender.

Turning to the application of Pattipeilohy's Framework to the EANCBs, there is a clear similarity in the method adopted, despite that the PF is based on different groupings of assets and liabilities. As explained earlier in Table 6.1, according to PF, the asset side is categorized into three groups: foreign exchange reserves (FX), domestic private sector debt (L) and domestic public sector debt (G). On the liabilities side, there are also three main categories: banknotes in circulation (Bn), liabilities to the banking sector (Rs) and liabilities to government (Rg). As illustrated in Appendix Table 6.1.2, a set of ratios is calculated to implement the classification rules in Column 2. Based on these classifications, each central bank is identified as being either a Foreign Exchange Holder (FXH), a Treasuries Holder (TH) or a Prviate Sector Lender (PSL). On the liabilities side, each central bank is labeled as being either a Note Issuer (NI), a Government's Banker (GB) or a Banker's Bank (BB).

Having explained the methodology of applying both frameworks, is it clear that the main difference between them is the categorization of the assets and liabilities into main groups (Table 6.1 and Table 6.2) and the way the classification rules are set (Appendix Table 6.1.1 and 6.1.2). This difference, as explained earlier, emerge from the fact that while the FEANCB account for intra-Eurosystem positions on the EANCBs' balance sheet, these are ignored in the PF. However, the latter framework focuses more on the domestic assets/liabilities, distinguishing between private and public sector debt on the asset side and liabilities to banks and to government on the liabilities side.

Appendix 6.2

The Classification of Securities between Domestic and Cross-Border Assets in the FEANCB

As noted earlier, the classification of the SMP, CBPP, CSPP and other securities between domestic and intra-Euro Area activities is not straightforward and differs according to the EANCB in the FEANCB. As shown in Appendix Table 6.2.1, which presents the differential classification of these items, for some EANCBs, particularly the 'periphery' EANCBs and the larger EANCBs, such programmes involve the purchase of local government and domestic private sector securities and are therefore classified as domestic assets. In contrast, the participation in these programmes by EANCBs in countries who were able to withstand the negative repercussions of the financial crisis on the financial and banking sector, led to cross-border positions on their balance sheet and are classified as such.

Appendix Table 6.2.1:

Differential Classification for Securities^
Intra-Euro Area Cross-Border and Domestic Positions

Securities	Cross-border Positions	Domestic Positions
Covered Bond Purchase Programme	AT, BE, CY, EE, FI, GR, LU, SK, SI	DE, ES, FR, IE, IT, NL, PT
Securities Market Programme	AT, BE, CY, DE, EE, FI, FR, LV, LU, MT, NL, SK, SI	ES, GR, IE, IT, PT,
Corporate Sector Purchase Programme	BE, FI	DE, ES, FR, IT
Public Sector Purchase Programme		All EANCBs
Other securities[84]	AT, BE, CY, DE, EE, FL, FR, LT, LV, MT, NL, SK, SI, LU	ES, IE, IT, GR, PT

^Balance Sheet Item 7
Source: Own compilation

Appendix Table 6.2.1 was compiled on the basis of sparsed published information and a number of assumptions. With respect to the SMP, according to the ECB, this programme involved the purchase of Greek, Irish, Portuguese, Italian and Spanish

[84] Other Securities (Balance Sheet Item No. 7.2) consist of purchases of euro-denominated bonds other than those under asset Item 7.1 'Securities held for monetary policy purposes' and under asset Item 11.3 'Other financial assets'.

government bonds. Therefore, it is assumed that these countries bought their own bonds and therefore classified as domestic assets. Meanwhile, the purchase of these bonds by EANCBs from other EA Member States is assumed to involve cross-border transactions. In the case of the PSPP, it was clearly stated that EANCBs bought their respective sovereign bonds and not the ones of other jurisdictions and are therefore entirely classified as domestic (similar to the treatment in PF). The new issuance of covered bonds eligible for CBPP involved issues by Spain, France, Germany, Netherlands, Italy, Ireland and Portugal. Similar to the assumption taken in the case of the SMP, it was assumed that these countries bought only covered bonds issued by institutions within their jurisdiction and therefore their involvement was classified as being domestic. Involvement in the CBPP by other EANCBs was assumed to be cross-border. The CSPP purchases were carried out by six EANCBs, four (DE, FR, IT, ES) of which covered only the market segment within their jurisdiction and therefore are assumed to be involved only with domestic purchases while for the other two (BE, FI) it is assumed to involve cross-border transactions.

At this juncture, the following example illustrates how the two frameworks contrast with respect to the definition of 'domestic assets/liabilities'. When the Bundesbank bought securities under the SMP, although no information is available with respect to which securities they purchased, it is known that it purchased either Greek, Irish, Portuguese, Italian or Spanish government bonds. Therefore, according to the new framework, for the Bundesbank this transaction involved a cross-border position on its balance sheet. In contrast, when applying Pattipeilohy's Framework to the EANCBs no distinction is made whether the Bundesbank bought German bonds or bonds of any other jurisdiction within the Euro Area and considers both as being domestic since the transaction involves EANCBs within the Eurosystem. This treatment results from the fact that this framework was originally designed for central banks that do not form part of a system of central banks and therefore transactions are carried out either with counterparties within the same jurisdiction – classified as domestic positions – or outside the country/Eurosystem – classified as foreign exchange.

Appendix 6.3 Overview of Changes in Central Banks' Balance Sheet Composition – Assets Framework for Euro Area National Central Banks (FEANCB)

EANCB	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	DAH	DAH	DAH	DAH	IEL	IEL	IEL	IEL	IEL	DAH	DAH
Belgium	DAH	DAH	DAH	DAH	IEL	DAH	DAH	IEL	IEL	IEL	DAH
Cyprus			DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	IEL
Estonia						IEL	IEL	IEL	IEL	IEL	DAH
Finland	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL
France	FXH	DAH	DAH	DAH	IEL	DAH	DAH	IEL	DAH	DAH	DAH
Germany	DAH	DAH	DAH	DAH	IEL	IEL	IEL	IEL	IEL	IEL	IEL
Greece	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH
Ireland	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH
Italy	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH
Latvia									FXH	IEL	IEL
Lithuania										DAH	DAH
Luxembourg	DAH	DAH	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL
Malta			IEL	DAH	IEL	IEL	IEL	IEL	IEL	IEL	IEL
Netherlands	IEL	DAH	DAH	DAH	IEL	IEL	IEL	IEL	IEL	IEL	IEL
Portugal	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH
Slovakia				IEL	IEL	IEL	IEL	IEL	IEL	IEL	DAH
Slovenia		IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL	IEL	DAH
Spain	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH	DAH
Eurosystem	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**	**DAH**

FXH = Foreign Exchange Holder; DAH = Domestic Assets Holder; IEL = Intra-Eurosystem Lender;

Appendix 6.4

Overview of Changes in Central Banks' Balance Sheet Composition – Liabilities Framework for Euro Area National Central Banks (FEANCB)

EANCB	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB
Belgium	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	BDM	BDM
Cyprus			IEB	IEB	IEB	IEB	IEB	IEB	BDM	BDM	BDM
Estonia						NI	BDM	BDM	BDM	BDM	BDM
Finland	NI	NI	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB
France	NI	BDM	IEB	BDM	NI	BDM	BDM	BDM	BDM	BDM	BDM
Germany	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Greece	NI	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB
Ireland	BDM	BDM	BDM	IEB	IEB	IEB	IEB	IEB	IEB	NI	NI
Italy	NI	NI	NI	NI	NI	IEB	IEB	IEB	IEB	IEB	IEB
Latvia									BDM	BDM	IEB
Lithuania										BDM	IEB
Luxembourg	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	BDM
Malta			BDM	BDM	IEB	BDM	BDM	BDM	IEB	BDM	BDM
Netherlands	NI	IEB	BDM	BDM	BDM	BDM	BDM	BDM	BDM	BDM	BDM
Portugal	IEB	BDM	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB	IEB
Slovakia				IEB	IEB	IEB	BDM	NI	NI	NI	NI
Slovenia		IEB	IEB	IEB	IEB	IEB	IEB	BDM	BDM	NI	BDM
Spain	NI	NI	BDM	BDM	IEB	IEB	IEB	IEB	IEB	IEB	IEB
Eurosystem	**NI**	**NI**	**BDM**	**BDM**	**BDM**	**BDM**	**BDM**	**IEB**	**NI**	**BDM**	**BDM**

NI = Note Issuer; BDM = Banker for Domestic Counterparties; IEB = Intra-Eurosystem Borrower;

Appendix 6.5

Overview of Changes in Central Banks' Balance Sheet Composition - Assets
Pattipeilohy's Framework

EANCB	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	PSL	PSL	PSL	PSL	TH	TH	PSL	TH	TH	TH	TH
Belgium	PSL	PSL	PSL	PSL	TH	PSL	PSL	TH	TH	TH	TH
Cyprus			PSL	PSL	PSL	PSL	TH	TH	TH	TH	TH
Estonia						TH	TH	TH	TH	TH	TH
Finland	FX	FX	TH	TH	TH	TH	TH	TH	TH	TH	TH
France	FX	FX	PSL	PSL	FX	PSL	PSL	TH	TH	TH	TH
Germany	PSL	PSL	PSL	PSL	FX	FX	FX	FX	FX	TH	TH
Greece	TH	TH	PSL	PSL	PSL	PSL	TH	PSL	PSL	PSL	TH
Ireland	PSL	PSL	PSL	PSL	PSL	PSL	PSL	TH	TH	TH	TH
Italy	FX	FX	TH	TH	TH	PSL	PSL	PSL	PSL	TH	TH
Luxembourg	PSL	PSL	PSL	PSL	TH	PSL	PSL	PSL	PSL	PSL	PSL
Malta			FX	PSL	PSL	TH	TH	TH	TH	FX	FX
Netherlands	FX	PSL	PSL	PSL	FX	FX	PSL	TH	TH	TH	TH
Portugal	FX	FX	PSL	PSL	PSL	PSL	PSL	PSL	PSL	PSL	TH
Slovakia				TH	TH	TH	TH	TH	TH	TH	TH
Slovenia		FX	TH	TH	TH	TH	PSL	PSL	TH	TH	TH
Lithuania										TH	TH
Latvia									FX	FX	TH
Spain	TH	TH	PSL	PSL	TH	PSL	PSL	PSL	PSL	PSL	TH
Eurosystem^	**PSL**	**PSL**	**PSL**	**PSL**	**PSL**	**PSL**	**PSL**	**PSL**	**PSL**	**TH**	**TH**

^The typology for the Eurosystem is based on the consolidated data as published by the ECB. Results will not be affected by using ESTA since this framework does not take intra-Eurosystem positions into account.

Appendix 6.6 Overview of Changes in Central Banks' Balance Sheet Composition - Liabilities Pattipeilohy's Framework

EANCB	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB	BB
Belgium	BB	BB	BB	BB	BB	BB	BB	NI	NI	BB	BB
Cyprus			BB	BB	BB	BB	BB	BB	BB	BB	BB
Estonia						NI	BB	BB	BB	BB	BB
Finland	NI	NI	BB	BB	BB	BB	BB	BB	BB	BB	BB
France	NI	BB	BB	BB	NI	BB	BB	BB	BB	BB	BB
Germany	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Greece	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Ireland	BB	BB	GB	GB	GB	NI	NI	NI	NI	NI	NI
Italy	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
Luxembourg	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	BB
Malta			BB	BB	BB	BB	BB	BB	NI	BB	BB
Netherlands	NI	NI	BB	BB	BB	BB	BB	BB	BB	BB	BB
Portugal	BB	BB	BB	BB	BB	BB	BB	BB	GB	BB	GB
Slovakia				NI	NI	NI	BB	NI	NI	NI	NI
Slovenia		BB	BB	BB	BB	BB	BB	BB	GB	NI	NI
Lithuania										BB	BB
Latvia									BB	BB	BB
Spain	NI	NI	NI	NI	NI	NI	BB	NI	NI	NI	BB
Eurosystem	**NI**	**NI**	**NI**	**NI**	**NI**	**BB**	**BB**	**NI**	**NI**	**NI**	**BB**

The typology for the Eurosystem is based on the ECB consolidated published data. Results will not be affected by using ESTA since this framework does not take intra-Eurosystem positions into account

Appendix 6.7 Simplified Balance Sheets – Framework for Euro Area National Central Banks

Simplified Balance Sheet – AUSTRIA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	11,306	13,522	25,223	12,669	16,733	23,944	21,595	17,500	21,329	21,618	24,034
A_{DOM}	12,575	13,113	27,362	20,6+64	8,602	11,028	16,307	7,505	13,067	26,030	41,166
A_{CB}	5,155	6,898	8,356	12,839	20,351	22,089	19,635	20,055	19,804	21,147	19,379
A_{O}	8,665	9,726	9,309	8,527	9,160	9,488	9,877	10,252	9,964	9,957	9,018
TOTAL ASSETS	**37,701**	**43,261**	**70,250**	**54,699**	**54,847**	**66,549**	**67,414**	**55,313**	**64,163**	**78,752**	**93,597**

Simplified Balance Sheet – AUSTRIA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	1,138	-633	6,737	3,725	-3,427	-10,113	-18,658	-17,675	-2,427	-440	-66
L_{DOM}	4,478	6,559	15,701	15,574	11,767	20,809	23,432	15,154	12,817	22,372	30,816
L_{CB}	21,160	25,402	35,662	19,584	27,496	34,614	39,897	39,148	30,083	29,147	31,138
Equity	7,316	7,679	8,619	9,927	12,878	14,569	15,351	11,043	12,849	12,427	13,974
L_{O}	3,608	4,253	3,530	5,889	6,132	6,669	7,391	7,643	10,842	15,246	17,735
TOTAL LIABILITIES	**37,701**	**43,261**	**70,250**	**54,699**	**54,847**	**66,549**	**67,413**	**55,313**	**64,163**	**78,752**	**93,597**

Simplified Balance Sheet – BELGIUM
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	10,423	11,949	47,330	16,931	20,550	30,722	23,486	19,749	21,504	22,514	22,835
A_{DOM}	40,261	56,342	60,818	43,665	9,514	49,655	41,449	15,987	11,677	22,237	53,212
A_{CB}	6,387	6,863	17,087	17,348	21,248	25,787	25,284	23,589	23,770	26,030	38,490
A_{O}	3,463	13,266	5,162	4,818	4,911	5,198	5,849	5,897	5,868	6,339	6,986
TOTAL ASSETS	**60,535**	**88,421**	**130,397**	**82,762**	**56,223**	**111,361**	**96,068**	**65,221**	**62,819**	**77,119**	**121,523**

Simplified Balance Sheet – BELGIUM
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	-1,623	-1,806	2,071	7,087	8,375	11,988	15,421	17,995	20,408	23,240	26,815
L_{DOM}	7,974	17,834	10,993	15,111	13,100	22,635	19,869	13,924	10,813	25,435	50,860
L_{CB}	45,269	61,660	104,243	42,490	13,871	52,859	38,059	15,454	12,335	7,726	18,589
Equity	5,550	6,429	7,501	10,099	12,399	14,000	15,082	11,905	12,973	13,208	14,493
L_{O}	3,365	4,304	5,589	7,976	8,479	9,878	7,636	5,943	6,291	7,510	10,765
TOTAL LIABILITIES	**60,535**	**88,421**	**130,397**	**82,762**	**56,224**	**111,361**	**96,067**	**65,221**	**62,819**	**77,119**	**121,523**

Simplified Balance Sheet – CYPRUS
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}			1,477	1,406	1,382	1,334	1,078	693	808	821	978
A_{DOM}			6,052	9,111	6,969	6,975	11,214	12,501	9,813	6,743	4,301
A_{CB}			2,610	2,579	3,024	2,595	1,746	990	988	3,916	7,340
A_{O}			445	208	198	3,701	152	120	119	122	125
TOTAL ASSETS			**10,583**	**13,304**	**11,573**	**14,606**	**14,190**	**14,305**	**11,729**	**11,602**	**12,745**

Simplified Balance Sheet – CYPRUS
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}			1,232	1,301	1,205	1,048	779	2,190	2,201	1,738	1,124
L_{DOM}			1,740	3,546	2,559	4,097	4,241	3,702	5,380	8,073	9,805
L_{CB}			6,551	7,128	6,442	7,909	7,473	6,841	2,498	-	-
Equity			397	549	610	711	827	778	657	790	821
L_{O}			663	781	757	840	871	794	993	1,002	995
TOTAL LIABILITIES			**10,583**	**13,304**	**11,573**	**14,606**	**14,191**	**14,305**	**11,728**	**11,602**	**12,745**

Simplified Balance Sheet – ESTONIA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}						167	247	267	424	463	434
A_{DOM}						12	24	16	54	1,306	3,308
A_{CB}						1,377	2,520	2,537	3,852	3,243	1,332
A_{O}						44	45	41	46	54	67
TOTAL ASSETS						**1,599**	**2,835**	**2,861**	**4,376**	**5,066**	**5,141**

Simplified Balance Sheet – ESTONIA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}						639	703	839	922	1,058	1,219
L_{DOM}						466	1,528	1,417	2,800	3,331	3,192
L_{CB}						-	-	-	-	-	-
Equity						374	406	417	442	455	487
L_{O}						121	199	188	212	221	243
TOTAL LIABILITIES						**1,600**	**2,836**	**2,861**	**4,376**	**5,066**	**5,141**

Simplified Balance Sheet – FINLAND
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	6,571	6,804	8,154	8,554	7,599	8,432	8,563	8,255	8,936	9,433	10,231
A_{DOM}	1,085	233	2,600	2,836	51	2,351	3,681	2,475	758	7,994	25,661
A_{CB}	7,314	10,998	13,833	19,182	33,838	82,686	84,574	34,427	32,981	34,795	38,391
A_{O}	933	1,048	1,254	1,130	1,090	1,171	1,115	1,052	1,082	1,088	1,341
TOTAL ASSETS	**15,903**	**19,083**	**25,841**	**31,702**	**42,578**	**94,640**	**97,933**	**46,209**	**43,757**	**53,309**	**75,625**

Simplified Balance Sheet – FINLAND
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	6,481	7,424	8,358	9,385	10,466	11,164	11,796	12,231	12,831	13,687	14,613
L_{DOM}	3,766	5,910	11,119	13,557	21,958	72,533	74,600	23,858	20,310	27,638	47,696
L_{CB}	-	-	-	-	33	76	-	-	-	-	-
Equity	2,651	2,968	3,887	4,138	4,732	5,322	5,278	4,237	4,955	5,422	5,675
L_{O}	3,005	2,784	2,478	4,620	5,386	5,557	6,262	5,883	5,663	6,565	7,641
TOTAL LIABILITIES	**15,903**	**19,086**	**25,842**	**31,700**	**42,575**	**94,652**	**97,936**	**46,209**	**43,759**	**53,312**	**75,625**

Simplified Balance Sheet – FRANCE
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	80,016	86,901	139,111	110,913	140,920	180,611	155,531	119,498	134,400	145,253	153,359
A_{DOM}	15,926	75,022	155,174	136,853	71,683	192,566	241,256	124,184	135,371	258,405	400,746
A_{CB}	30,520	26,222	84,283	76,732	94,825	147,643	133,143	128,792	119,176	119,053	107,688
A_{O}	42,248	105,252	98,879	106,743	97,692	110,854	127,007	100,710	107,593	99,631	94,705
TOTAL ASSETS	**168,710**	**293,397**	**477,447**	**431,241**	**405,120**	**631,674**	**656,937**	**473,184**	**496,540**	**622,342**	**756,498**

Simplified Balance Sheet – FRANCE
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	56,777	61,540	69,290	76,363	80,909	88,584	95,796	101,932	108,299	112,759	119,846
L_{DOM}	26,631	74,047	104,027	80,143	47,818	181,812	195,641	110,266	112,408	233,681	346,624
L_{CB}	-	12,035	117,880	62,077	28,363	77,515	54,850	16,195	17,020	29,315	14,123
Equity	34,091	43,167	54,891	57,424	104,886	115,976	121,086	87,965	102,008	106,766	119,307
L_{O}	51,209	102,606	131,359	155,232	143,144	167,787	189,562	156,826	156,803	139,821	156,495
TOTAL LIABILITIES	**168,708**	**293,395**	**477,447**	**431,239**	**405,120**	**631,674**	**656,935**	**473,184**	**496,538**	**622,342**	**756,395**

Simplified Balance Sheet – GERMANY
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	84,765	99,596	162,447	129,954	162,100	202,731	191,972	143,879	158,745	159,532	177,553
A_{DOM}	263,837	285,472	303,895	243,078	132,456	84,546	95,892	74,630	88,624	210,681	408,471
A_{CB}	18,573	84,250	128,854	195,282	358,666	531,915	718,465	565,770	506,630	624,599	789,518
A_{O}	6,361	14,355	17,364	19,731	18,037	18,450	18,979	16,756	16,843	17,160	17,472
TOTAL ASSETS	**373,536**	**483,673**	**612,560**	**588,045**	**671,259**	**837,642**	**1,025,308**	**801,035**	**770,842**	**1,011,972**	**1,393,014**

Simplified Balance Sheet – GERMANY
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	255,215	283,279	328,379	348,110	366,720	391,753	427,539	461,509	508,432	552,630	592,169
L_{DOM}	47,992	109,556	167,109	122,150	146,605	229,617	311,832	143,472	92,135	220,388	444,274
L_{CB}	-	-	-	-	-	-	-	-	-	-	-
Equity	55,138	64,329	74,369	85,925	117,708	135,054	138,241	97,671	112,445	113,909	125,621
L_{O}	15,190	26,510	42,706	31,857	40,229	81,218	147,696	98,381	57,830	125,044	230,952
TOTAL LIABILITIES	**373,535**	**483,674**	**612,563**	**588,042**	**671,262**	**837,642**	**1,025,308**	**801,033**	**770,842**	**1,011,971**	**1,393,016**

Simplified Balance Sheet – GREECE
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	3,250	3,756	5,700	5,023	6,299	7,771	7,322	5,528	6,891	7,316	8,045
A_{DOM}	20,780	27,710	60,739	77,016	126,903	154,611	146,803	98,845	90,525	147,468	124,249
A_{CB}	2,103	2,446	2,314	2,272	3,186	2,999	3,161	2,936	3,596	6,436	7,774
A_{O}	8,792	8,750	2,167	2,283	2,273	3,054	2,492	2,186	2,146	2,294	2,316
TOTAL ASSETS	**34,925**	**42,661**	**70,920**	**86,594**	**138,661**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Simplified Balance Sheet – GREECE
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	16,907	18,669	20,776	20,972	29,670	41,395	38,036	35,480	32,356	48,383	43,243
L_{DOM}	5,446	8,301	9,315	9,341	11,310	8,541	7,890	8,902	6,597	5,136	9,177
L_{CB}	8,184	10,797	35,348	49,036	87,133	104,808	98,355	51,116	49,319	94,387	72,257
Equity	1,318	1,740	2,043	2,723	4,079	4,865	5,065	3,191	3,858	3,887	4,531
L_{O}	3,071	3,154	3,438	4,521	6,448	8,827	10,431	10,806	11,028	11,720	13,176
TOTAL LIABILITIES	**34,925**	**42,661**	**70,920**	**86,594**	**138,640**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Simplified Balance Sheet – IRELAND
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	718	1,077	5,770	1,613	1,726	2,490	1,791	1,188	1,461	2,024	3,404
A_{DOM}	35,242	49,762	107,748	108,417	150,760	170,816	132,625	103,425	76,147	70,739	74,833
A_{CB}	3,814	2,121	1,860	2,031	1,662	2,039	2,114	2,371	3,022	3,698	3,543
A_{O}	480	568	754	12,836	50,341	901	955	1,127	678	775	1,005
TOTAL ASSETS	**40,253**	**53,529**	**116,132**	**124,897**	**204,489**	**176,246**	**137,485**	**108,110**	**81,308**	**77,235**	**82,786**

Simplified Balance Sheet – IRELAND
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	16,842	20,258	23,323	25,520	27,289	28,414	29,269	30,528	31,534	32,686	33,965
L_{DOM}	18,378	29,865	45,264	41,168	27,302	21,601	23,154	13,503	10,866	23,735	29,628
L_{CB}	2,545	595	44,364	53,519	145,185	120,434	79,259	55,117	22,745	3,039	952
Equity	1,155	1,253	1,558	1,737	1,953	2,196	2,444	5,699	12,292	14,132	14,486
L_{O}	1,333	1,558	1,623	2,949	2,760	3,602	3,360	3,263	3,870	3,643	3,755
TOTAL LIABILITIES	**40,253**	**53,529**	**116,132**	**124,893**	**204,489**	**176,247**	**137,486**	**108,110**	**81,308**	**77,235**	**82,785**

Simplified Balance Sheet – ITALY
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	64,390	69,122	82,595	93,851	120,986	136,835	140,603	106,397	118,375	121,133	130,344
A_{DOM}	41,197	46,179	109,672	96,018	152,636	344,381	404,372	370,914	331,445	380,274	545,743
A_{CB}	30,845	43,745	31,401	63,222	11,849	8,451	9,189	10,001	9,982	9,988	10,021
A_{O}	82,126	85,331	43,764	48,166	47,491	49,311	52,202	54,228	48,454	43,712	52,312
TOTAL ASSETS	**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**606,367**	**541,540**	**508,255**	**555,107**	**738,420**

Simplified Balance Sheet – ITALY
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	119,728	128,458	139,472	143,198	145,417	153,564	146,343	144,674	142,159	142,027	145,955
L_{DOM}	40,104	52,338	54,854	65,340	65,229	57,407	61,467	47,914	23,295	28,959	81,763
L_{CB}	-	-	-	-	-	190,899	253,799	228,382	208,576	248,547	355,667
Equity	40,351	47,371	53,677	66,715	92,208	105,878	112,009	80,764	93,495	95,824	106,150
L_{O}	18,374	16,209	19,427	26,003	30,107	31,231	32,750	39,806	40,730	39,750	48,884
TOTAL LIABILITIES	**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**606,369**	**541,540**	**508,256**	**555,107**	**738,420**

Simplified Balance Sheet – LATVIA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}									3,138	3,699	3,685
A_{DOM}									90	738	973
A_{CB}									1,589	3,020	6,051
A_{O}									92	166	161
TOTAL ASSETS									**4,910**	**7,624**	**10,870**

Simplified Balance Sheet – LATVIA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}									734	497	247
L_{DOM}									2,475	4,831	4,239
L_{CB}									797	1,312	5,292
Equity									479	451	453
L_{O}									425	531	638
TOTAL LIABILITIES									**4,910**	**7,624**	**10,870**

Simplified Balance Sheet – LITHUANIA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}										2,677	3,078
A_{DOM}										2,854	6,643
A_{CB}										1,971	1,069
A_{O}										77	117
TOTAL ASSETS										**7,580**	**10,908**

Simplified Balance Sheet – LITHUANIA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}										2,209	2,525
L_{DOM}										4,140	3,171
L_{CB}										-	3,590
Equity										633	680
L_{O}										598	941
TOTAL LIABILITIES										**7,580**	**10,907**

Simplified Balance Sheet – LUXMEBOURG
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	237	1,445	11,110	632	731	4,418	2,315	2,061	2,814	2,272	2,259
A_{DOM}	41,512	33,645	40,660	16,166	3,783	6,320	7,002	8,419	3,789	4,664	8,049
A_{CB}	8,966	21,739	48,131	58,084	73,563	115,678	110,619	107,650	110,018	151,471	189,958
A_{O}	1,731	2,180	743	2,166	1,642	792	485	430	478	552	584
TOTAL ASSETS	**52,446**	**59,009**	**100,645**	**77,049**	**79,719**	**127,207**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Simplified Balance Sheet – LUXEMBOURG
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	41,081	46,201	52,622	60,560	66,910	72,034	76,352	87,526	93,492	95,494	96,590
L_{DOM}	10,215	11,213	45,919	13,832	9,990	51,725	39,031	25,142	17,243	57,796	98,276
L_{CB}	-	-	-	-	-	-	-	-	-	-	-
Equity	199	204	260	501	481	418	528	341	376	346	367
L_{O}	951	1,392	1,845	2,155	2,339	3,029	4,508	5,552	5,987	5,322	5,618
TOTAL LIABILITIES	**52,446**	**59,009**	**100,645**	**77,049**	**79,720**	**127,206**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Simplified Balance Sheet – MALTA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}			691	618	654	674	750	569	629	690	832
A_{DOM}			618	1,253	1,075	513	379	215	412	394	751
A_{CB}			782	770	1,210	1,600	1,739	2,095	2,291	2,198	2,997
A_{O}			631	602	705	770	736	731	995	1,224	956
TOTAL ASSETS			**2,723**	**3,244**	**3,643**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Simplified Balance Sheet – MALTA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}			748	768	806	868	848	841	867	974	1,034
L_{DOM}			845	978	891	1,522	1,721	1,444	796	1,728	3,571
L_{CB}			667	814	1,225	428	200	672	1,927	920	-
Equity			284	315	327	338	371	374	395	407	426
L_{O}			179	369	395	402	463	279	341	476	505
TOTAL LIABILITIES			**2,723**	**3,244**	**3,644**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Simplified Balance Sheet – NETHERLANDS
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	18,905	20,471	34,581	28,864	35,252	40,298	41,400	33,353	35,970	35,388	35,166
A_{DOM}	14,514	50,358	40,160	40,840	10,105	11,318	27,894	11,759	14,280	45,520	88,658
A_{CB}	17,640	11,732	14,834	30,029	57,087	180,045	145,991	76,051	47,503	82,016	115,661
A_{O}	7,639	8,265	9,654	11,587	8,029	7,637	8,538	3,051	2,577	2,783	3,392
TOTAL ASSETS	**58,698**	**90,826**	**99,229**	**111,320**	**110,473**	**239,298**	**223,823**	**124,214**	**100,330**	**165,707**	**242,877**

Simplified Balance Sheet – NETHERLANDS
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	23,793	23,590	23,818	22,478	21,208	19,322	17,287	15,847	13,598	11,961	11,480
L_{DOM}	13,673	21,532	29,396	57,928	50,099	175,611	158,045	73,985	50,135	114,484	172,470
L_{CB}	-	21,949	18,814	-	-	-	-	-	-	-	-
Equity	15,634	17,753	19,425	22,047	27,609	31,120	32,095	25,835	27,956	26,905	29,317
L_{O}	5,598	6,002	7,776	8,866	11,557	13,246	16,396	8,547	8,641	12,357	29,610
TOTAL LIABILITIES	**58,698**	**90,826**	**99,229**	**111,319**	**110,473**	**239,299**	**223,823**	**124,214**	**100,330**	**165,707**	**242,877**

Simplified Balance Sheet – PORTUGAL
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	8,280	8,469	8,583	11,095	16,264	16,821	17,621	13,072	16,494	17,988	24,260
A_{DOM}	6,745	7,796	18,754	24,153	54,455	61,927	67,659	61,926	49,133	55,566	67,818
A_{CB}	3,180	5,145	1,794	2,879	3,016	1,892	1,833	1,835	1,606	1,653	1,697
A_{O}	4,786	4,956	5,866	6,452	6,971	7,308	7,268	6,561	6,455	6,612	6,307
TOTAL ASSETS	**22,990**	**26,366**	**34,996**	**44,579**	**80,707**	**87,947**	**94,381**	**83,394**	**73,688**	**81,819**	**100,081**

Simplified Balance Sheet – PORTUGAL
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	4,516	3,041	1,575	663	333	-1,369	-4,022	-5,895	-8,621	-10,394	-11,976
L_{DOM}	5,074	9,266	5,402	8,774	4,922	10,435	13,359	15,848	11,419	13,306	17,494
L_{CB}	6,601	6,206	18,953	23,436	59,921	60,964	66,026	59,565	54,638	61,705	71,588
Equity	4,223	5,408	6,367	8,064	11,633	13,371	14,263	9,267	11,223	10,790	12,711
L_{O}	2,576	2,445	2,701	3,642	3,896	4,547	4,755	4,609	5,029	6,413	10,264
TOTAL LIABILITIES	**22,990**	**26,366**	**34,996**	**44,578**	**80,707**	**87,948**	**94,381**	**83,394**	**73,688**	**81,819**	**100,081**

Simplified Balance Sheet – SLOVAKIA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}				1,373	1,725	2,160	2,029	1,595	2,929	2,831	3,277
A_{DOM}				2,163	1,054	1,307	1,981	362	626	4,830	11,894
A_{CB}				13,240	14,555	16,254	13,942	14,036	13,073	9,231	6,869
A_{O}				5,784	6,420	6,608	6,595	6,083	5,480	5,330	5,315
TOTAL ASSETS				**22,560**	**23,754**	**26,329**	**24,548**	**22,076**	**22,109**	**22,222**	**27,355**

Simplified Balance Sheet – SLOVAKIA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}				4,646	5,947	7,241	8,163	8,701	9,357	10,058	10,854
L_{DOM}				1,237	1,766	975	8,932	6,968	6,354	6,264	5,409
L_{CB}				14,500	13,306	13,600	-	76	-	-	5,042
Equity				727	903	1,122	1,768	1,435	979	796	1,042
L_{O}				1,451	1,833	3,390	5,684	4,896	5,418	5,104	5,008
TOTAL LIABILITIES				**22,560**	**23,754**	**26,328**	**24,547**	**22,076**	**22,109**	**22,222**	**27,355**

Simplified Balance Sheet – SLOVENIA
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}		1,214	943	996	1,059	1,011	990	876	974	1,004	964
A_{DOM}		1,128	1,833	2,135	697	2,029	4,031	3,716	1,329	2,963	6,171
A_{CB}		3,427	3,821	4,068	4,117	4,488	4,820	4,044	6,260	4,589	4,518
A_{O}		257	329	285	214	211	227	226	204	291	340
TOTAL ASSETS		**6,025**	**6,926**	**7,483**	**6,086**	**7,740**	**10,069**	**8,861**	**8,767**	**8,847**	**11,993**

Simplified Balance Sheet – SLOVENIA
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}		565	817	991	1,166	1,366	1,372	2,184	2,527	3,485	4,412
L_{DOM}		750	1,262	1,505	1,166	2,013	2,361	3,796	4,160	3,361	4,201
L_{CB}		3,491	3,556	3,334	2,093	2,728	4,409	1,024	-	-	1,223
Equity		818	853	995	1,028	1,010	1,132	986	1,066	1,059	1,111
L_{O}		402	439	658	634	623	794	870	1,013	942	1,045
TOTAL LIABILITIES		**6,025**	**6,926**	**7,483**	**6,087**	**7,741**	**10,068**	**8,861**	**8,767**	**8,847**	**11,993**

Simplified Balance Sheet – SPAIN
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	11,500	15,222	22,947	19,245	23,596	40,288	40,589	35,675	44,039	53,247	64,710
A_{DOM}	58,680	146,904	173,732	180,245	153,463	278,083	460,934	285,329	233,101	296,452	401,937
A_{CB}	30,748	9,761	7,716	6,462	6,493	6,568	6,675	6,263	6,743	6,742	6,436
A_{O}	36,883	3,341	4,594	4,325	3,710	4,174	7,270	6,460	5,189	4,695	5,947
TOTAL ASSETS	**137,811**	**175,229**	**208,988**	**210,277**	**187,261**	**329,113**	**515,467**	**333,727**	**289,072**	**361,136**	**479,030**

Simplified Balance Sheet – SPAIN
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	86,979	85,517	83,143	80,600	76,558	70,571	65,425	57,133	47,902	41,473	32,164
L_{DOM}	35,616	70,351	73,085	66,322	36,301	56,359	81,125	32,901	17,910	28,171	73,045
L_{CB}	-	3,238	34,922	41,034	50,864	174,826	336,831	213,382	189,718	254,103	327,733
Equity	8,741	8,376	9,902	11,693	13,795	16,362	18,364	14,086	18,937	21,482	22,884
L_{O}	6,475	7,747	7,936	10,628	9,743	10,994	13,722	16,226	14,606	15,908	23,204
TOTAL LIABILITIES	**137,811**	**175,229**	**208,988**	**210,277**	**187,261**	**329,113**	**515,467**	**333,727**	**289,072**	**361,136**	**479,030**

Simplified Balance Sheet – EUROPEAN CENTRAL BANK
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	42,432	43,171	74,500	51,105	61,056	65,899	64,520	54,726	62,164	67,403	71,430
A_{DOM}	0	100	0	2,182	17,959	23,024	22,056	18,160	17,790	77,861	160,914
A_{CB}	3,550	17,266	234,725	6,360	1,800	50,849	24,674	535	-	-	-
A_{O}	9,525	11,376	13,656	13,838	15,532	20,009	23,036	24,259	24,013	24,707	26,543
TOTAL ASSETS	**55,507**	**71,913**	**322,881**	**73,485**	**96,347**	**159,781**	**134,285**	**97,680**	**103,968**	**169,971**	**258,887**

Simplified Balance Sheet – EUROPEAN CENTRAL BANK
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	-	-	-	-	-	-	-	-	-	-	-
L_{DOM}	39,782	40,042	40,150	40,204	61,430	40,308	40,308	40,430	64,133	123,876	191,994
L_{CB}	1,065	1,050	1,020	1,056	1,105	1,261	1,024	1,054	1,020	1,026	2,912
Equity	9,668	10,296	16,812	17,311	25,103	31,537	31,980	22,451	28,624	33,655	37,559
L_{O}	4,992	20,525	264,900	14,914	8,709	86,675	60,973	33,745	10,192	11,414	26,422
TOTAL LIABILITIES	**55,507**	**71,913**	**322,881**	**73,485**	**96,347**	**159,781**	**134,285**	**97,680**	**103,968**	**169,971**	**258,887**

Simplified Balance Sheet – EUROSYSTEM^
Framework for Euro Area National Central Banks (FEANCB)

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A_{FX}	342,793	382,720	631,161	494,842	618,632	766,606	722,401	564,880	642,025	677,306	740,879
A_{DOM}	552,354	793,765	1,109,816	1,006,794	902,166	1,401,464	1,685,559	1,200,367	1,078,029	1,623,718	2,435,498
A_{CB}	168,794	252,612	602,399	513,378	710,489	1,204,954	1,310,123	1,003,979	912,883	1,115,796	1,358,731
A_{O}	213,632	268,671	214,572	249,481	274,415	249,681	272,828	240,171	238,277	227,568	235,010
TOTAL ASSETS	**1,277,572**	**1,697,767**	**2,557,949**	**2,264,495**	**2,505,702**	**3,622,705**	**3,990,912**	**3,009,397**	**2,871,214**	**3,644,388**	**4,770,119**

Simplified Balance Sheet – EUROSYSTEM
Framework for Euro Area National Central Banks (FEANCB)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
L_{B}	627,834	676,103	762,361	806,367	839,551	888,469	912,451	956,039	1,016,571	1,083,526	1,126,213
L_{DOM}	220,412	418,572	577,051	517,561	453,888	919,419	1,029,252	543,249	408,933	833,856	1,438,622
L_{CB}	123,540	185,414	461,109	357,156	497,363	881,968	1,019,467	727,402	653,788	854,077	1,099,190
Equity	186,035	217,791	260,844	300,889	432,333	494,224	516,290	378,446	446,009	463,343	512,096
L_{O}	119,746	199,891	496,587	282,511	282,548	438,639	513,453	404,259	345,913	409,588	593,896
TOTAL LIABILITIES	**1,277,568**	**1,697,770**	**2,557,953**	**2,264,483**	**2,505,682**	**3,622,718**	**3,990,913**	**3,009,395**	**2,871,213**	**3,644,390**	**4,770,018**

^Total assets and total liabilities may differ due to rounding. Eurosystem data is the amalgamation of the nineteen EANCBs and the ECB referred to earlier as ESTA.

Appendix 6.8 Detailed Balance Sheets – Framework for a Euro Area National Central Banks

Detailed Balance Sheet of the Central Bank of Austria

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables	4,481	5,115	5,595	6,899	9,501	10,954	11,353	7,843	8,892	8,761	9,885
Claims on non-Euro Residents in Foreign Currency	5,204	7,192	6,342	5,597	7,147	8,446	9,216	8,963	11,607	11,637	12,210
Claims on EA Residents in Foreign Currency	1,621	1,215	13,286	173	85	4,544	1,026	695	829	1,221	1,940
ACB											
Claims on non-Euro Residents in €	604	987	1,634	1,596	2,685	2,040	1,532	1,858	2,041	1,489	1,246
Intra-Eurosystem Claims (BN adj)	1,274	1,278	1,278	1,230	1,263	1,295	1,327	1,335	1,359	1,359	1,359
SMP	-	-	-	-	2,263	5,787	5,893	5,274	4,235	3,543	2,890
CBPP	-	-	-	678	1,562	1,777	2,000	1,828	1,894	4,311	4,778
Other Securities	3,277	4,633	5,443	9,334	12,578	11,190	8,882	9,760	10,275	10,444	9,105
ADOM											
Lending to EA Credit Institutions related to MPO in €	12,151	12,695	22,533	20,236	8,182	10,612	15,894	7,094	12,659	14,223	11,346
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	11,402	29,419
Claims on the Federal Government	424	419	429	427	420	416	413	411	408	405	401
Other Claims on EA Credit Institutions in €	-	-	4,400	-	-	-	-	-	-	-	-
AO											
Items in Course of Settlement	103	101	103	106	73	26	-	-	-	-	-
Other Assets	8,562	9,625	9,206	8,421	9,087	9,463	9,877	10,252	9,964	9,957	9,018
TOTAL ASSETS	**37,701**	**43,261**	**70,250**	**54,699**	**54,847**	**66,549**	**67,414**	**55,313**	**64,163**	**78,752**	**93,597**

Detailed Balance Sheet of the Central Bank of Austria (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes	1,138	-633	6,737	3,725	-3,427	-10,113	-18,658	-17,675	-2,427	-440	-66
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €	4,474	6,548	15,642	15,513	11,699	20,801	23,228	14,938	12,636	21,532	27,446
Other Liabilities to EA Credit Institutions in €	-	-	50	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents in Euro: General Government	5	11	9	62	68	8	203	216	181	840	3,370
LCB											
Intra-Eurosystem Liabilities	21,160	25,402	35,662	19,584	27,496	34,614	39,897	39,148	30,083	29,147	31,138
Liabilities Equivalent to the Transfer of Foreign Reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)	21,160	25,402	35,662	19,584	27,496	34,614	39,897	39,148	30,083	29,147	31,138
Net Liabilities re the Allocation of Euro Banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Other Operational Requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation Accounts	3,176	3,529	4,474	5,757	8,690	10,366	11,125	6,806	8,595	8,125	9,662
Capital and Reserve	4,126	4,133	4,142	4,149	4,166	4,185	4,198	4,217	4,229	4,246	4,294
Profit for the Year	14	17	3	21	22	19	28	20	26	56	18
LO											
Other Liabilities	3,608	4,253	3,530	5,889	6,132	6,669	7,391	7,643	10,842	15,246	17,735
TOTAL LIABILITIES	**37,701**	**43,261**	**70,250**	**54,699**	**54,847**	**66,549**	**67,414**	**55,313**	**64,163**	**78,752**	**93,597**

Detailed Balance Sheet of the Central Bank of Belgium

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables	3,533	4,158	4,547	5,606	7,720	8,899	9,223	6,370	7,223	7,115	8,028
Claims on non-Euro Residents in Foreign Currency	6,621	6,997	6,663	11,080	12,409	13,927	14,022	13,109	13,826	15,050	14,411
Claims on EA Residents in Foreign Currency	269	794	36,120	246	421	7,896	242	269	455	349	396
ACB											
Claims on non-Euro Residents in €	346	187	344	507	582	773	663	555	563	419	805
Intra-Eurosystem Claims (BN adj)	1,562	1,567	1,567	1,537	1,577	1,618	1,658	1,665	1,723	1,723	1,723
SMP	-	-	-	-	2,814	7,005	6,957	6,123	4,845	4,054	3,358
CBPP	-	-	-	984	1,954	2,109	1,999	1,479	2,196	5,274	7,300
CSPP	-	-	-	-	-	-	-	-	-	-	11,382
Other Securities	4,479	5,109	5,176	14,321	14,320	14,282	14,007	13,766	14,443	14,559	13,922
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €	39,910	56,312	57,967	41,277	7,215	40,421	40,010	15,985	11,676	7,738	14,322
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	14,324	37,027
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions in €	351	31	2,851	2,388	2,299	9,234	1,439	2	1	174	1,863
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other Assets	3,463	13,266	5,162	4,818	4,911	5,198	5,849	5,897	5,868	6,339	6,986
TOTAL ASSETS	**60,535**	**88,421**	**130,397**	**82,762**	**56,223**	**111,361**	**96,068**	**65,221**	**62,819**	**77,119**	**121,523**

Detailed Balance Sheet of the Central Bank of Belgium (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes	-1,623	-1,806	2,071	7,087	8,375	11,988	15,421	17,995	20,408	23,240	26,815
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €	7,928	17,789	10,804	14,777	12,996	22,570	19,572	13,798	10,763	25,224	50,686
Other Liabilities to EA Credit Institutions in €	-	-	130	226	22	-	-	-	-	173	139
Liabilities to Other EA Residents in Euro: General Government	46	45	58	108	82	65	296	126	49	38	35
LCB											
Intra-Eurosystem Liabilities	45,269	61,660	104,243	42,490	13,871	52,859	38,059	15,454	12,335	7,726	18,589
Liabilities Equivalent to the Transfer of Foreign Reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)	45,269	61,660	140,243	42,490	13,871	52,859	38,059	15,454	12,335	7,726	18,589
Net Liabilities re the Allocation of Euro Banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Other Operational Requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation Accounts	3,246	3,930	4,655	5,515	7,690	9,014	9,433	6,310	7,409	7,441	8,370
Capital and Reserve	2,059	2,216	2,401	2,672	3,877	4,087	4,312	4,648	4,885	5,217	5,485
Profit for the Year	244	283	445	1,912	832	899	1,337	947	680	550	638
LO											
Other Liabilities	3,365	4,304	5,589	7,976	8,479	9,878	7,636	5,943	6,291	7,510	10,765
TOTAL LIABILITIES	**60,535**	**88,421**	**130,397**	**82,762**	**56,223**	**111,361**	**96,068**	**65,221**	**62,819**	**77,119**	**121,523**

Detailed Balance Sheet of the Central Bank of Cyprus

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables			278	342	472	544	563	389	441	435	490
Claims on non-Euro Residents in Foreign Currency			428	541	374	391	343	278	352	375	470
Claims on EA Residents in Foreign Currency			771	522	536	399	172	26	15	12	18
ACB											
Claims on non-Euro Residents in €			69	-	-	-	-	-	5	5	5
Intra-Eurosystem Claims (BN adj)			95	106	108	110	112	109	127	2,500	5,973
SMP			-	-	138	353	302	260	243	199	171
CBPP			-	51	109	109	125	92	111	308	409
Other Securities			2,446	2,422	2,669	2,022	1,207	529	502	903	782
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €			4,370	7,559	5,466	5,521	411	1,600	1,116	886	650
Public Sector Purchase Programme			-	-	-	-	-	-	-	815	2,267
Claims on the Federal Government			1,597	1,551	1,503	1,454	1,403	1,351	1,297	1,242	1,185
Other Claims on EA Credit Institutions in €			85	1	-	-	9,400	9,550	7,400	3,800	200
AO											
Items in Course of Settlement			66	40	29	57	32	38	37	35	35
Other Assets			378	168	168	3,644	120	82	82	87	90
TOTAL ASSETS			**10,583**	**13,304**	**11,573**	**14,606**	**14,190**	**14,305**	**11,729**	**11,602**	**12,745**

Detailed Balance Sheet of the Central Bank of Cyprus (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes			1,232	1,301	1,205	1,048	779	2,190	2,201	1,738	1,124
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €			1,292	3,101	2,289	3,173	3,984	2,773	4,131	7,210	9,037
Other Liabilities to EA Credit Institutions in €			-	-	-	-	-	-	10	-	50
Liabilities to Other EA Residents in Euro: General Government			448	445	270	924	257	928	1,239	862	718
LCB											
Intra-Eurosystem Liabilities			6,551	7,128	6,442	7,909	7,473	6,841	2,498	-	-
Liabilities Equivalent to the Transfer of Foreign Reserves			-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)			6,551	7,128	6,442	7,909	7,473	6,841	2,498	-	-
Net Liabilities re the Allocation of Euro Banknotes within the ES			-	-	-	-	-	-	-	-	-
Liabilities related to Other Operational Requirements			-	-	-	-	-	-	-	-	-
Equity											
Revaluation Accounts			326	370	478	549	567	382	441	425	474
Capital and Reserve			62	64	117	145	148	170	216	249	272
Profit for the Year			9	115	15	17	112	225	-	116	74
LO											
Other Liabilities			663	781	757	840	871	794	993	1,002	995
TOTAL LIABILITIES			**10,583**	**13,304**	**11,573**	**14,606**	**14,190**	**14,305**	**11,729**	**11,602**	**12,745**

Detailed Balance Sheet of the Central Bank of Estonia

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables						10	10	7	8	8	9
Claims on non-Euro Residents in Foreign Currency						152	216	220	352	372	323
Claims on EA Residents in Foreign Currency						5	21	40	64	83	102
ACB											
Claims on non-Euro Residents in €						2	3	2	0	1	12
Intra-Eurosystem Claims (BN adj)						831	1,952	2,038	3,406	2,975	1,138
SMP						342	341	274	216	143	109
CBPP						2	32	32	28	13	13
Other Securities						200	191	191	202	111	59
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €						0	13.9	5	52	75	86
Public Sector Purchase Programme						-	-	-	-	1,228	3,217
Claims on the Federal Government						-	-	-	-	-	-
Other Claims on EA Credit Institutions in €						12	10	11	2	2	5
AO											
Items in Course of Settlement						-	-	-	-	-	-
Other Assets						44	45	41	46	54	67
TOTAL ASSETS						**1,599**	**2,835**	**2,861**	**4,376**	**5,066**	**5,141**

Detailed Balance Sheet of the Central Bank of Estonia (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes						639	703	839	922	1,058	1,219
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €						466	1,528	1,417	2,800	3,331	3,192
Other Liabilities to EA Credit Institutions in Euro						-	-	-	-	-	-
Liabilities to Other EA Residents in Euro: General Government						-	-	-	-	-	-
LCB											
Intra-Eurosystem Liabilities						-	-	-	-	-	-
Liabilities Equivalent to the Transfer of Foreign Reserves						-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)						-	-	-	-	-	-
Net liabilities re the Allocation of Euro Banknotes within the ES						-	-	-	-	-	-
Liabilities related to Other Operational Requirements						-	-	-	-	-	-
Equity											
Revaluation Accounts						10	14	10	23	11	19
Capital and Reserve						341	358	384	402	414	437
Profit for the Year						23	34	23	17	30	31
LO											
Other Liabilities						121	199	188	212	221	243
TOTAL LIABILITIES						**1,599**	**2,835**	**2,861**	**4,376**	**5,066**	**5,141**

Detailed Balance Sheet of the Central Bank of Finland

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables	761	896	980	1,208	1,664	1,918	1,988	1,373	1,557	1,534	1,731
Claims on non-Euro Residents in Foreign Currency	4,749	4,514	4,597	6,226	5,223	5,886	6,171	6,585	7,019	7,482	7,852
Claims on EA Residents in Foreign Currency	1,061	1,394	2,577	1,120	712	628	404	297	360	417	648
ACB											
Claims on non-Euro Residents in €	368	394	581	845	1,662	1,946	1,970	1,347	1,044	1,443	1,803
Intra-Eurosystem Claims (BN adj)	1,948	3,741	5,987	10,335	20,507	66,850	71,133	23,017	20,621	20,993	22,730
SMP	-	-	-	-	1,238	3,630	3,447	2,808	2,365	1,973	1,606
CBPP	-	-	-	531	965	1,007	1,109	909	1,203	2,798	3,789
CSPP											1,488
Other Securities	4,998	6,863	7,265	7,471	9,466	9,253	6,915	6,346	7,748	7,588	6,975
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €	1,025	230	2,600	2,710	50	2,311	3,681	2,475	722	690	6,728
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	7,304	18,902
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions in €	60	3	-	126	1	40	-	-	36	-	31
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other Assets	933	1,048	1,254	1,130	1,090	1,171	1,115	1,052	1,082	1,088	1,341
TOTAL ASSETS	**15,903**	**19,083**	**25,841**	**31,702**	**42,578**	**94,640**	**97,933**	**46,209**	**43,757**	**53,309**	**75,625**

Detailed Balance Sheet of the Central Bank of Finland (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes	6,481	7,424	8,358	9,385	10,466	11,164	11,796	12,231	12,831	13,687	14,613
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €	3,766	5,910	8,110	13,543	21,696	71,697	73,799	23,803	20,308	27,559	47,665
Other Liabilities to EA Credit Institutions in Euro	-	-	-	-	-	-	-	-	-	-	-
Liabilities to Other EA Residents in Euro: General Government	-	-	3,009	14	262	836	801	55	2	79	31
LCB											
Intra-Eurosystem Liabilities	-	-	-	-	33	76	-	-	-	-	-
Liabilities Equivalent to the Transfer of Foreign Reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)	-	-	-	-	-	-	-	-	-	-	-
Net Liabilities re the Allocation of Euro Banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Other Operational Requirements	-	-	-	-	33	76	-	-	-	-	-
Equity											
Revaluation Accounts	762	854	1,622	1,703	2,274	2,806	2,609	1,556	2,304	2,762	2,982
Capital and Reserve	1,596	1,704	1,864	2,015	2,175	2,262	2,332	2,442	2,501	2,514	2,562
Profit for the Year	293	410	401	420	283	254	337	239	150	146	131
Lo											
Other Liabilities	3,005	2,784	2,478	4,620	5,386	5,557	6,262	5,883	5,663	6,565	7,641
TOTAL LIABILITIES	**15,903**	**19,083**	**25,841**	**31,702**	**42,578**	**94,640**	**97,933**	**46,209**	**43,757**	**53,309**	**75,625**

Detailed Balance Sheet of the Central Bank of France

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables	42,210	47,557	49,802	60,006	82,640	95,282	98,751	68,217	77,343	76,211	85,993
Claims on non-Euro Residents in Foreign Currency	30,410	25,304	23,716	36,953	46,340	40,720	48,708	37,069	40,949	50,091	55,309
Claims on EA Residents in Foreign Currency	7,396	14,040	65,593	13,954	11,940	44,609	8,072	14,212	16,108	18,951	12,057
ACB											
Claims on non-euro residents in €	2,303	2,257	5,793	2,940	6,901	10,113	6,539	6,363	3,226	4,376	3,778
Intra-Eurosystem Claims (BN adj)	19,995	9,454	9,750	9,276	9,492	10,047	10,318	10,143	10,083	9,930	9,958
SMP					9,353	36,946	37,661	33,243	27,310	24,092	20,662
Other Securities	8,222	14,511	68,740	64,516	69,079	90,538	78,625	79,043	78,557	80,656	73,290
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €	13,695	71,055	134,463	120,984	34,984	129,336	181,933	74,250	76,054	89,303	70,730
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	103,750	253,248
CBPP	-	-	-	4,166	11,505	12,786	14,141	11,024	14,459	32,963	42,537
CSPP	-	-	-	-	-	-	-	-	-	-	15,600
Claims on the Federal Government	82	42	0	-	-	-	-	-	-	-	-
Other Claims on EA Credit Institutions in €	2,149	3,925	20,711	11,703	25,194	50,444	45,182	38,910	44,858	32,389	18,631
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other Assets	42,248	105,252	98,879	106,743	97,692	110,854	127,007	100,710	107,593	99,631	94,705
TOTAL ASSETS	**168,710**	**293,397**	**477,447**	**431,241**	**405,120**	**631,674**	**656,937**	**473,184**	**496,540**	**622,342**	**756,498**

Detailed Balance Sheet of the Central Bank of France (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes	56,777	61,540	69,290	76,363	80,909	88,584	95,796	101,932	108,299	112,759	119,846
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €	26,378	73,698	90,843	61,076	44,643	171,001	189,832	106,980	109,955	219,802	328,789
Other Liabilities to EA Credit Institutions in €	18	40	139	62	1,688	1,874	926	20	15	10	3,953
Liabilities to Other EA Residents in Euro: General Government	235	309	13,045	19,005	1,487	8,937	4,883	3,266	2,438	13,869	13,882
LCB											
Intra-Eurosystem Liabilities	-	12,035	117,880	62,077	28,363	77,515	54,850	16,195	17,020	29,315	14,123
Liabilities Equivalent to the Transfer of Foreign Reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)	-	12,035	117,880	62,077	28,363	77,515	54,850	16,195	17,020	29,315	14,123
Net Liabilities re the Allocation of Euro Banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Other Operational Requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation Accounts	21,633	27,558	31,978	42,892	67,961	81,709	85,050	52,037	65,335	68,438	79,246
Capital and Reserve	11,212	13,292	20,453	12,059	34,366	32,697	32,890	33,487	34,607	36,100	36,539
Profit for the Year	1,246	2,317	2,460	2,473	2,559	1,570	3,146	2,441	2,066	2,228	3,522
LO											
Other Liabilities	51,209	102,606	131,359	155,232	143,144	167,787	189,562	156,826	156,803	139,821	156,495
TOTAL LIABILITIES	**168,710**	**293,397**	**477,447**	**431,241**	**405,120**	**631,674**	**656,937**	**473,184**	**496,540**	**622,342**	**756,498**

Detailed Balance Sheet of the Central Bank of Germany

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables	53,114	62,433	68,194	83,939	115,403	132,874	137,513	94,876	107,475	105,792	119,253
Claims on non-Euro Residents in Foreign Currency	31,651	30,112	30,990	41,603	46,697	51,729	51,118	48,878	51,270	53,740	56,512
Claims on EA Residents in Foreign Currency	-	7,051	63,263	4,412	-	18,128	3,341	125	-	-	1,788
ACB											
Claims on non-Euro Residents in €	300	300	300	300	-	-	-	-	-	-	438
Intra-Eurosystem Claims (BN adj)	18,273	83,950	128,554	189,706	337,851	475,894	667,895	523,370	473,007	596,929	766,912
SMP	-	-	-	-	15,569	51,135	50,570	42,400	33,623	27,670	22,168
Other Securities	-	-	-	5,276	5,246	4,886	-	-	-	-	-
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €	256,348	267,955	277,424	223,610	103,076	55,796	73,093	52,055	65,572	58,096	65,474
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	104,227	269,646
Claims on the Federal Government	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440	4,440
Other claims on EA Credit Institutions in €	3,049	13,077	22,031	7,136	9,610	8,464	1,442	4,691	2,011	3,540	3,025
CBPP	-	-	-	7,892	15,330	15,846	16,917	13,444	16,601	40,378	53,865
CSPP	-	-	-	-	-	-	-	-	-	-	12,021
AO											
Items in Course of Settlement	1	4	2	2	1	3	2	3	1	1	1
Other Assets	6,360	14,351	17,362	19,729	18,036	18,447	18,977	16,753	16,842	17,159	17,471
TOTAL ASSETS	**373,536**	**483,673**	**612,560**	**588,045**	**671,259**	**837,642**	**1,025,308**	**801,035**	**770,842**	**1,011,972**	**1,393,014**

Detailed Balance Sheet of the Central Bank of Germany (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual Issue of Notes	255,215	283,279	328,379	348,110	366,720	391,753	427,539	461,509	508,432	552,630	592,169
LDOM											
Liabilities to EA Credit Institutions re Monetary Policy Operations in €	47,956	109,513	166,939	112,163	146,432	228,872	299,962	141,459	90,195	208,741	411,350
Other Liabilities to EA Credit Institutions in €	-	-	-	-	-	-	-	-	-	-	466
Liabilities to Other EA Residents in Euro: General Government	36	43	170	9,987	173	745	11,870	2,013	1,940	11,647	32,458
LCB											
Intra-Eurosystem Liabilities	-	-	-	-	-	-	-	-	-	-	-
Liabilities Equivalent to the Transfer of Foreign Reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and Correspondent Accounts (net)	-	-	-	-	-	-	-	-	-	-	-
Net Liabilities re the Allocation of Euro Banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Other Operational Requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation Accounts	45,933	55,044	63,108	76,778	110,502	129,411	132,577	88,080	104,491	105,720	119,658
Capital and Reserve	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,564
Profit for the Year	4,205	4,285	6,261	4,147	2,206	643	664	4,591	2,954	3,189	399
LO											
Other Liabilities	15,190	26,510	42,706	31,857	40,229	81,218	147,696	98,381	57,830	125,044	230,952
TOTAL LIABILITIES	**373,536**	**483,673**	**612,560**	**588,045**	**671,259**	**837,642**	**1,025,308**	**801,035**	**770,842**	**1,011,972**	**1,393,014**

Detailed Balance Sheet of the Central Bank of Greece

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and Gold Receivables	2,211	2,617	2,925	3,633	5,005	5,770	5,985	4,145	4,721	4,656	5,262
Claims on non-Euro Residents in Foreign Currency	486	439	302	1,108	1,010	982	993	1,059	1,571	2,046	2,579
Claims on EA Residents in Foreign Currency	553	700	2,474	282	284	1,019	344	324	600	613	205
ACB											
Claims on non-Euro Residents in €	649	1,002	831	0	0	0	0	0	0	0	0
Intra-Eurosystem Claims (BN adj)	1,454	1,444	1,483	1,598	1,600	1,633	1,814	1,743	1,774	1,782	1,854
CBPP	-	-	-	674	1,586	1,366	1,347	1,193	1,822	4,654	5,920
ADOM											
Lending to EA Credit Institutions related to Monetary Policy Operations in €	4,795	8,727	38,355	49,655	97,669	76,160	19,347	63,226	56,039	38,599	22,953
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	13,082	34,213
Claims on the Federal Government	8,745	8,232	7,778	7,294	6,867	6,660	6,170	5,658	5,249	4,844	6,353
Other Claims on EA Credit Institutions in €	942	232	77	73	73	52,009	101,851	9,791	1	68,915	43,665
SMP	-	-	-	-	3,332	6,400	5,618	4,877	3,965	2,975	2,352
Other Securities	6,298	10,519	14,529	19,994	18,963	13,383	13,818	15,294	25,270	19,053	14,713
AO											
Items in Course of Settlement	2	3	1	2	0	0	2	2	-	-	-
Other Assets	8,790	8,746	2,167	2,280	2,272	3,054	2,490	2,185	2,146	2,294	2,316
TOTAL ASSETS	**34,925**	**42,661**	**70,920**	**86,594**	**138,661**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Detailed Balance Sheet of the Central Bank of Greece (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	16,907	18,669	20,776	20,972	29,670	41,395	38,036	35,480	32,356	48,383	43,243
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	4,530	7,108	7,794	8,008	10,528	4,703	2,169	1,959	3,076	1,387	907
Other liabilities to EA credit institutions in Euro	22	33	-	-	-	-	-	-	-	-	-
Liabilities to other EA residents in Euro: General government	894	1,159	1,521	1,333	782	3,838	5,721	6,943	3,521	3,749	8,270
LCB											
Intra-Eurosystem liabilities	8,184	10,797	35,348	49,036	87,133	104,808	98,355	51,116	49,319	94,387	72,257
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	8,184	10,797	35,348	49,036	87,088	104,750	98,355	51,116	49,319	94,387	72,257
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	45	58	-	-	-	-	-
Equity											
Revaluation accounts	651	965	1,249	1,917	3,264	4,050	4,250	2,376	3,043	3,072	3,716
Capital and Reserve	667	775	794	805	815	815	815	816	815	815	815
Profit for the year	-	-	-	-	-	-	-	-	-	-	-
LO											
Other liabilities	3,071	3,154	3,438	4,521	6,448	8,827	10,431	10,806	11,028	11,720	13,176
TOTAL LIABILITIES	**34,925**	**42,661**	**70,920**	**86,594**	**138,640**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Detailed Balance Sheet of the Central Bank of Ireland

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	93	110	120	148	204	235	244	168	191	188	212
Claims on non-euro residents denominated in foreign currency	566	522	587	1,346	1,382	1,081	1,051	1,019	1,270	1,836	3,191
Claims on EA residents denominated in foreign currency	59	446	5,063	119	141	1,174	496	-	-	-	-
ACB											
Claims on non-euro residents in €	3,243	1,553	1,274	1,234	883	1,231	1,229	1,515	2,127	2,813	2,653
Intra-Eurosystem Claims (BN adj)	570	569	585	796	779	808	886	857	895	885	890
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	27,044	39,449	93,412	92,858	132,010	107,236	70,936	39,046	20,700	10,735	7,418
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	6,824	17,440
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	1,060	429	114	636	514	42,849	40,426	562	351	373	160
SMP	-	-	-	-	2,137	3,903	3,409	2,688	2,518	1,950	1,712
CBPP	-	-	-	532	866	886	953	619	879	2,329	3,282
Other securities	7,137	9,884	14,222	14,391	15,233	15,941	16,901	60,510	51,700	48,527	44,821
AO											
Items in Course of Settlement	47	7	4	3	3	13	14	23	0	0	-
Other assets	433	561	750	12,834	50,337	888	941	1,104	678	775	1,005
TOTAL ASSETS	**40,253**	**53,529**	**116,132**	**124,897**	**204,489**	**176,246**	**137,485**	**108,110**	**81,308**	**77,235**	**82,786**

Detailed Balance Sheet of the Central Bank of Ireland (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	16,842	20,258	23,323	25,520	27,289	28,414	29,269	30,528	31,534	32,686	33,965
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	12,915	21,839	19,447	14,908	11,414	6,029	3,518	3,243	4,055	10,018	19,225
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	-	-	-	-
Liabilities to other EA residents in Euro: General government	5,463	8,025	25,817	26,260	15,888	15,572	19,636	10,261	6,811	13,718	10,403
LCB											
Intra-Eurosystem liabilities	2,545	595	44,364	53,519	145,185	120,434	79,259	55,117	22,745	3,039	952
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	2,545	595	44,364	53,519	145,185	120,434	79,259	55,117	22,745	3,039	952
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	58	88	242	205	230	303	335	3,262	9,611	10,819	10,887
Capital and Reserve	1,097	1,165	1,316	1,531	1,723	1,893	2,110	2,437	2,681	3,313	3,599
Profit for the year	-	-	-	-	-	-	-	-	-	-	-
LO											
Other liabilities	1,333	1,558	1,623	2,949	2,760	3,602	3,360	3,263	3,870	3,643	3,755
TOTAL LIABILITIES	**40,253**	**53,529**	**116,132**	**124,896**	**204,489**	**176,247**	**137,486**	**108,110**	**81,308**	**77,235**	**82,786**

Detailed Balance Sheet of the Central Bank of Italy

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	38,050	44,793	48,995	60,410	83,197	95,924	99,417	68,677	77,865	76,718	86,558
Claims on non-euro residents denominated in foreign currency	19,483	19,276	26,647	31,782	35,724	38,016	38,283	36,834	39,269	43,202	42,498
Claims on EA residents denominated in foreign currency	6,857	5,052	6,952	1,658	2,065	2,896	2,903	886	1,241	1,213	1,288
ACB											
Claims on non-euro residents in €	-	1	9	11	6	99	629	1,405	1,516	1,521	1,554
Intra-Eurosystem Claims (BN adj)	30,845	43,744	31,392	63,211	11,843	8,352	8,560	8,596	8,467	8,467	8,467
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	20,957	28,070	50,344	27,156	47,635	209,995	271,784	235,869	194,522	158,276	204,238
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	71,573	186,646
Claims on the Federal Government	18,252	18,098	17,946	17,794	17,642	17,458	14,620	14,484	14,349	14,215	14,081
Other claims on EA credit institutions in	10	10	154	359	2,954	2,655	1,540	9,030	4,959	101	35
SMP	-	-	-	-	8,018	33,217	33,598	28,621	23,403	19,987	16,405
CBPP	-	-	-	5,015	10,061	9,839	10,925	8,951	12,083	29,948	36,343
CSPP	-	-	-	-	-	-	-	-	-	-	5,827
Other securities	1,977	-	41,228	45,694	66,326	71,217	71,906	73,958	82,129	86,174	82,167
AO											
Items in Course of Settlement	8	1	2	3	6	14	8	13	4	11	19
Other assets	82,118	85,330	43,762	48,163	47,485	49,297	52,194	54,216	48,450	43,701	52,293
TOTAL ASSETS	**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**606,367**	**541,540**	**508,255**	**555,107**	**738,420**

Detailed Balance Sheet of the Central Bank of Italy (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	119,728	128,458	139,472	143,198	145,417	153,564	146,343	144,674	142,159	142,027	145,955
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	17,159	42,623	35,441	34,313	22,740	33,878	27,665	20,789	15,436	24,138	71,984
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	8	-	-	-
Liabilities to other EA residents in Euro: General government	22,945	9,716	19,413	31,027	42,488	23,529	33,802	27,117	7,859	4,821	9,780
LCB											
Intra-Eurosystem liabilities	-	-	-	-	-	190,899	253,799	228,382	208,576	248,547	355,667
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	-	-	-	-	190,899	253,799	228,382	208,576	248,547	355,667
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	23,446	29,976	33,880	44,968	70,206	83,004	86,900	54,191	66,201	67,981	78,118
Capital and Reserve	16,771	17,300	19,622	20,079	21,149	21,745	22,607	23,538	24,297	25,046	25,346
Profit for the year	134	95	175	1,669	852	1,129	2,501	3,035	2,998	2,797	2,686
LO											
Other liabilities	18,374	16,209	19,427	26,003	30,107	31,231	32,750	39,806	40,730	39,750	48,884
TOTAL LIABILITIES	**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**606,369**	**541,540**	**508,256**	**555,107**	**738,420**

Detailed Balance Sheet of the Central Bank of Latvia

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	-	-	-	-	-	-	-	-	211	208	234
Claims on non-euro residents denominated in foreign currency	-	-	-	-	-	-	-	-	2,441	2,950	3,092
Claims on EA residents denominated in foreign currency	-	-	-	-	-	-	-	-	486	541	359
ACB											
Claims on non-euro residents in €	-	-	-	-	-	-	-	-	215	169	145
Intra-Eurosystem Claims (BN adj)	-	-	-	-	-	-	-	-	279	307	293
SMP	-	-	-	-	-	-	-	-	-	1,336	3,650
CBPP	-	-	-	-	-	-	-	-	-	-	-
Other securities	-	-	-	-	-	-	-	-	1,095	1,207	1,962
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	-	-	-	-	-	-	-	-	86	264	257
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	472	707
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	-	-	-	-	-	-	-	-	4	2	9
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other assets	-	-	-	-	-	-	-	-	92	166	161
TOTAL ASSETS	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4,910**	**7,624**	**10,870**

Detailed Balance Sheet of the Central Bank of Latvia (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	-	-	-	-	-	-	-	-	734	497	247
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	-	-	-	-	-	-	-	-	2,423	4,784	4,191
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	-	1	9	1
Liabilities to other EA residents in Euro: General government	-	-	-	-	-	-	-	-	51	38	47
LCB											
Intra-Eurosystem liabilities	-	-	-	-	-	-	-	-	797	1,312	5,292
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	-	-	-	-	-	-	-	797	1,312	5,292
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	-	-	-	-	-	-	-	-	479	451	453
Capital and Reserve	-	-	-	-	-	-	-	-	-	-	-
Profit for the year	-	-	-	-	-	-	-	-	-	-	-
LO											
Other liabilities	-	-	-	-	-	-	-	-	425	531	638
TOTAL LIABILITIES	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4,910**	**7,624**	**10,870**

Detailed Balance Sheet of the Central Bank of Lithuania

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	-	-	-	-	-	-	-	-	-	182	206
Claims on non-euro residents denominated in foreign currency	-	-	-	-	-	-	-	-	-	2,379	2,736
Claims on EA residents denominated in foreign currency	-	-	-	-	-	-	-	-	-	116	137
ACB											
Claims on non-euro residents in €	-	-	-	-	-	-	-	-	-	317	71
Intra-Eurosystem Claims (BN adj)	-	-	-	-	-	-	-	-	-	739	500
SMP	-	-	-	-	-	-	-	-	-	-	-
CBPP	-	-	-	-	-	-	-	-	-	-	-
Other securities	-	-	-	-	-	-	-	-	-	916	497
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	-	-	-	-	-	-	-	-	-	346	303
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	2,508	6,340
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	-	-	-	-	-	-	-	-	-	0	0
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other assets	-	-	-	-	-	-	-	-	-	77	117
TOTAL ASSETS	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7,580**	**10,908**

Detailed Balance Sheet of the Central Bank of Lithuania (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	-	-	-	-	-	-	-	-	-	2,209	2,525
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	-	-	-	-	-	-	-	-	-	2,842	2,481
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	-	-	26	-
Liabilities to other EA residents in Euro: General government	-	-	-	-	-	-	-	-	-	1,273	690
LCB											
Intra-Eurosystem liabilities	-	-	-	-	-	-	-	-	-	-	3,590
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	-	-	-	-	-	-	-	-	-	3,590
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	-	-	-	-	-	-	-	-	-	193	224
Capital and Reserve	-	-	-	-	-	-	-	-	-	418	429
Profit for the year	-	-	-	-	-	-	-	-	-	22	27
LO											
Other liabilities	-	-	-	-	-	-	-	-	-	598	941
TOTAL LIABILITIES	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7,580**	**10,908**

Detailed Balance Sheet of the Central Bank of Luxembourg

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	36	42	45	55	76	88	91	63	72	70	79
Claims on non-euro residents denominated in foreign currency	164	97	239	506	560	695	660	687	639	638	843
Claims on EA residents denominated in foreign currency	37	1,306	10,826	71	95	3,635	1,564	1,311	2,103	1,564	1,337
ACB											
Claims on non-euro residents in €	1,301	1,254	2,235	1,601	1,560	2,045	1,299	1,026	1,529	1,300	806
Intra-Eurosystem Claims (BN adj)	5,315	18,399	42,168	52,573	68,000	109,438	105,883	103,670	105,220	147,672	187,320
SMP	-	-	-	-	292	515	464	422	364	194	153
CBPP	-	-	-	45	138	129	117	61	127	403	569
Other securities	2,350	2,085	3,728	3,865	3,573	3,550	2,856	2,470	2,779	1,902	1,110
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	41,511	32,915	40,080	15,156	2,769	5,199	5,675	5,819	3,357	3,657	4,907
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	996	2,822
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	1	731	580	1,010	1,014	1,121	1,327	2,600	431	11	320
AO											
Items in Course of Settlement	0	-	-	-	-	-	-	-	-	-	0
Other assets	1,731	2,180	743	2,166	1,642	792	485	430	478	552	584
TOTAL ASSETS	**52,446**	**59,009**	**100,645**	**77,049**	**79,719**	**127,207**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Detailed Balance Sheet of the Central Bank of Luxembourg (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	41,081	46,201	52,622	60,560	66,910	72,034	76,352	87,526	93,492	95,494	96,590
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	9,742	10,780	45,532	13,489	9,642	51,223	38,479	24,565	16,664	57,237	97,433
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	-	-	-	-
Liabilities to other EA residents in Euro: General government	473	434	387	344	348	502	553	576	579	559	843
LCB											
Intra-Eurosystem liabilities	-	-	-	-	-	-	-	-	-	-	-
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	-	-	-	-	-	-	-	-	-	-
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	31	31	84	319	298	233	342	152	186	154	173
Capital and Reserve	161	168	172	175	182	184	185	187	188	190	192
Profit for the year	7	4	3	7	2	1	2	2	2	2	2
LO											
Other liabilities	951	1,392	1,845	2,155	2,339	3,029	4,508	5,552	5,987	5,322	5,618
TOTAL LIABILITIES	**52,446**	**59,009**	**100,645**	**77,049**	**79,720**	**127,206**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Detailed Balance Sheet of the Central Bank of Malta

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	-	-	4	5	4	10	13	13	5	4	3
Claims on non-euro residents denominated in foreign currency	-	-	251	375	399	387	512	419	519	528	647
Claims on EA residents denominated in foreign currency	-	-	435	238	251	277	224	138	106	158	182
ACB											
Claims on non-euro residents in €	-	-	260	96	105	182	383	607	837	946	983
Intra-Eurosystem Claims (BN adj)	-	-	47	48	49	50	51	52	53	53	1,072
SMP	-	-	-	-	119	165	128	90	67	56	52
CBPP	-	-	-	-	-	-	-	-	-	-	-
Other securities	-	-	475	626	937	1,203	1,177	1,345	1,333	1,143	890
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	-	-	454	1,253	1,075	498	378	200	411	115	55
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	278	686
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	-	-	164	1	1	15	0	15	0	1	10
AO											
Items in Course of Settlement	-	-	5	5	7	14	6	6	6	9	11
Other assets	-	-	626	597	698	756	730	725	989	1,215	945
TOTAL ASSETS	**-**	**-**	**2,723**	**3,244**	**3,643**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Detailed Balance Sheet of the Central Bank of Malta (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	-	-	748	768	806	868	848	841	867	974	1,034
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	-	-	483	585	501	1,101	1,474	1,144	499	1,457	2,917
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	-	-	-	-
Liabilities to other EA residents in Euro: General government	-	-	362	393	390	421	247	300	297	271	654
LCB											
Intra-Eurosystem liabilities	-	-	667	814	1,225	428	200	672	1,927	920	-
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	-	667	814	1,225	428	200	672	1,927	920	-
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	-	-	8	17	12	14	18	10	19	12	20
Capital and Reserve	-	-	234	253	266	282	301	314	328	345	356
Profit for the year	-	-	42	46	48	42	52	50	48	50	50
LO											
Other liabilities	-	-	179	369	395	402	463	279	341	476	505
TOTAL LIABILITIES	**-**	**-**	**2,723**	**3,244**	**3,644**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Detailed Balance Sheet of the Central Bank of Netherlands

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	9,947	11,353	12,239	15,090	20,782	23,961	24,834	17,155	19,450	19,164	21,622
Claims on non-euro residents denominated in foreign currency	8,081	6,625	8,190	12,445	13,802	15,973	16,414	16,198	16,119	15,993	12,872
Claims on EA residents denominated in foreign currency	877	2,493	14,152	1,329	668	364	152	-	401	231	672
ACB											
Claims on non-euro residents in €	481	643	98	95	28	126	185	243	248	359	1,013
Intra-Eurosystem Claims (BN adj)	12,384	2,478	2,478	17,883	42,850	155,179	122,626	48,477	22,250	57,410	89,352
SMP	-	-	-	-	4,201	11,516	11,395	10,196	7,846	7,237	6,087
Other securities	4,775	8,611	12,258	12,051	10,008	13,224	11,785	17,135	17,159	17,010	19,209
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	11,089	45,961	34,815	37,596	2,569	3,380	24,511	8,814	10,782	13,000	16,552
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	23,119	60,204
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	3,425	4,397	5,345	1,612	4,295	4,628	-	100	251	240	302
CBPP	-	-	-	1,632	3,241	3,310	3,383	2,845	3,247	9,161	11,600
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other assets	7,639	8,265	9,654	11,587	8,029	7,637	8,538	3,051	2,577	2,783	3,392
TOTAL ASSETS	**58,698**	**90,826**	**99,229**	**111,320**	**110,473**	**239,298**	**223,823**	**124,214**	**100,330**	**165,707**	**242,877**

Detailed Balance Sheet of the Central Bank of Netherlands (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	23,793	23,590	23,818	22,478	21,208	19,322	17,287	15,847	13,598	11,961	11,480
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	13,662	21,528	29,372	57,902	50,000	175,606	158,038	73,938	49,943	114,399	170,959
Other liabilities to EA credit institutions in Euro	-	-	-	-	-	-	-	-	-	-	145
Liabilities to other EA residents in Euro: General government	11	4	24	26	99	5	7	47	192	85	1,366
LCB											
Intra-Eurosystem liabilities	-	21,949	18,814	-	-	-	-	-	-	-	-
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	21,949	18,814	-	-	-	-	-	-	-	-
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	9,169	10,659	12,110	14,941	20,365	23,413	24,284	16,846	19,135	18,804	21,347
Capital and Reserve	6,465	7,094	7,315	7,106	7,244	7,707	7,811	7,811	7,870	7,918	7,927
Profit for the year	-	-	-	-	-	-	-	1,178	951	183	43
LO											
Other liabilities	5,598	6,002	7,776	8,866	11,557	13,246	16,396	8,547	8,641	12,357	29,610
TOTAL LIABILITIES	**58,698**	**90,826**	**99,229**	**111,320**	**110,473**	**239,298**	**223,823**	**124,214**	**100,330**	**165,707**	**242,877**

Detailed Balance Sheet of the Central Bank of Portugal

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	5,937	6,989	7,644	9,425	12,979	14,964	15,509	10,714	12,147	11,968	13,503
Claims on non-euro residents denominated in foreign currency	1,548	842	931	1,670	2,732	1,524	1,663	2,013	3,997	5,832	10,374
Claims on EA residents denominated in foreign currency	795	638	7	0	553	332	449	345	351	188	383
ACB											
Claims on non-euro residents in €	2,092	4,044	635	1,694	1,864	694	512	562	354	418	388
Intra-Eurosystem Claims (BN adj)	1,088	1,101	1,158	1,185	1,152	1,198	1,322	1,273	1,252	1,235	1,309
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	161	2,464	10,210	16,061	40,899	46,001	52,784	47,864	31,191	26,161	22,372
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	10,104	26,414
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	-	0	1	1	0	0	58	44	59	33	28
SMP	-	-	-	-	2,773	5,859	5,659	4,873	3,960	3,239	2,715
CBPP	-	-	-	648	1,388	1,410	1,325	1,159	1,312	3,346	3,125
Other securities	6,583	5,331	8,544	7,443	9,395	8,656	7,832	7,988	12,612	12,682	13,165
AO											
Items in Course of Settlement	4	0	6	6	2	0	0	3	0	0	0
Other assets	4,781	4,956	5,860	6,447	6,969	7,308	7,268	6,558	6,454	6,612	6,307
TOTAL ASSETS	**22,990**	**26,366**	**34,996**	**44,579**	**80,707**	**87,947**	**94,381**	**83,394**	**73,688**	**81,819**	**100,081**

Detailed Balance Sheet of the Central Bank of Portugal (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	4,516	3,041	1,575	663	333	-1,369	-4,022	-5,895	-8,621	-10,394	-11,976
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	5,049	9,266	5,402	8,771	4,921	5,691	8,136	8,218	3,589	7,712	5,649
Other liabilities to EA credit institutions in Euro	25	-	-	-	-	-	-	-	-	-	-
Liabilities to other EA residents in Euro: General government	0	0	0	2	1	4,743	5,223	7,629	7,830	5,593	11,845
LCB											
Intra-Eurosystem liabilities	6,601	6,206	18,953	23,436	59,921	60,964	66,026	59,565	54,638	61,705	71,588
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	6,601	6,206	18,953	23,436	59,912	60,923	66,026	59,565	54,591	61,687	71,588
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	9	41	-	0	47	18	0
Equity											
Revaluation accounts	2,935	3,971	4,788	6,479	10,055	12,061	12,657	7,758	9,637	9,296	11,027
Capital and Reserve	1,100	1,155	1,230	1,330	1,381	1,278	1,156	1,256	1,282	1,261	1,244
Profit for the year	188	282	349	254	198	31	449	253	304	233	441
Lo											
Other liabilities	2,576	2,445	2,701	3,642	3,896	4,547	4,755	4,609	5,029	6,413	10,264
TOTAL LIABILITIES	**22,990**	**26,366**	**34,996**	**44,579**	**80,707**	**87,947**	**94,381**	**83,394**	**73,688**	**81,819**	**100,081**

Detailed Balance Sheet of the Central Bank of Slovakia

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	-	-	-	781	1,075	1,240	1,285	888	1,006	992	1,119
Claims on non-euro residents denominated in foreign currency	-	-	-	486	538	652	622	671	1,819	1,653	1,885
Claims on EA residents denominated in foreign currency	-	-	-	106	112	268	122	36	103	186	273
ACB											
Claims on non-euro residents in €	-	-	-	2,450	2,911	3,090	2,583	2,931	3,905	3,324	2,187
Intra-Eurosystem Claims (BN adj)	-	-	-	594	605	617	1,606	3,378	3,007	1,231	711
SMP	-	-	-	-	840	1,864	1,721	1,283	820	635	411
CBPP	-	-	-	268	554	552	491	387	538	1,607	2,219
Other securities	-	-	-	9,928	9,645	10,132	7,541	6,057	4,802	2,433	1,341
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	-	-	-	2,063	1,005	1,264	1,942	329	570	661	761
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	4,141	11,110
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	-	-	-	100	49	43	40	33	56	28	23
AO											
Items in Course of Settlement	-	-	-	-	-	0	-	-	-	-	-
Other assets	-	-	-	5,784	6,420	6,608	6,595	6,083	5,480	5,330	5,315
TOTAL ASSETS	**-**	**-**	**-**	**22,560**	**23,754**	**26,329**	**24,548**	**22,076**	**22,109**	**22,222**	**27,355**

Detailed Balance Sheet of the Central Bank of Slovakia (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	-	-	-	4,646	5,947	7,241	8,163	8,701	9,357	10,058	10,854
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	-	-	-	1,198	715	646	691	1,285	752	1,496	1,877
Other liabilities to EA credit institutions in Euro	-	-	-	39	1,050	329	5,635	2,960	4,601	4,768	2,788
Liabilities to other EA residents in Euro: General government	-	-	-	0	0	1	2,607	2,723	1,001	0	744
LCB											
Intra-Eurosystem liabilities	-	-	-	14,500	13,306	13,600	-	76	-	-	5,042
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	-	-	14,500	13,306	13,600	-	76	-	-	5,042
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	-	-	-	298	544	765	1,210	588	519	434	537
Capital and Reserve	-	-	-	358	358	358	358	358	358	358	358
Profit for the year	-	-	-	71	-	-	199	490	102	5	147
LO											
Other liabilities	-	-	-	1,451	1,833	3,390	5,684	4,896	5,418	5,104	5,008
TOTAL LIABILITIES	**-**	**-**	**-**	**22,560**	**23,754**	**26,329**	**24,548**	**22,076**	**22,109**	**22,222**	**27,355**

Detailed Balance Sheet of the Central Bank of Slovenia

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	-	58	64	78	108	125	129	89	101	100	112
Claims on non-euro residents denominated in foreign currency	-	657	618	672	692	641	592	578	734	685	591
Claims on EA residents denominated in foreign currency	-	498	262	245	259	246	269	209	139	220	260
ACB											
Claims on non-euro residents in €	-	1,083	1,140	878	768	786	782	784	1,022	1,059	1,217
Intra-Eurosystem Claims (BN adj)	-	241	239	248	253	259	264	264	2,686	542	282
SMP	-	-	-	-	402	992	975	662	489	288	219
CBPP	-	-	-	85	266	173	123	65	188	680	995
Other securities	-	2,103	2,442	2,857	2,428	2,279	2,676	2,269	1,875	2,021	1,804
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	-	156	1,198	2,115	602	1,740	3,982	3,337	1,098	901	714
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	2,011	5,255
Claims on the Federal Government	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	-	972	636	20	95	289	49	379	230	51	201
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other assets	-	257	329	285	214	211	227	226	204	291	340
TOTAL ASSETS	**-**	**6,025**	**6,926**	**7,483**	**6,086**	**7,740**	**10,069**	**8,861**	**8,767**	**8,847**	**11,993**

Detailed Balance Sheet of the Central Bank of Slovenia (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	-	565	817	991	1,166	1,366	1,372	2,184	2,527	3,485	4,412
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	-	356	984	1,220	882	1,126	1,320	2,068	1,434	1,627	2,249
Other liabilities to EA credit institutions in Euro	-	53	10	14	14	15	18	14	8	4	3
Liabilities to other EA residents in Euro: General government	-	341	268	271	270	872	1,023	1,714	2,718	1,730	1,949
LCB											
Intra-Eurosystem liabilities	-	3,491	3,556	3,334	2,093	2,728	4,409	1,024	-	-	1,223
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	3,491	3,556	3,334	2,093	2,728	4,409	1,024	-	-	1,223
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	-	18	101	167	188	163	156	69	116	122	151
Capital and Reserve	-	800	752	724	802	831	844	866	874	882	903
Profit for the year	-	-	-	104	38	17	132	50	75	54	57
LO											
Other liabilities	-	402	439	658	634	623	794	870	1,013	942	1,045
TOTAL LIABILITIES	**-**	**6,025**	**6,926**	**7,483**	**6,086**	**7,740**	**10,069**	**8,861**	**8,767**	**8,847**	**11,993**

Detailed Balance Sheet of the Central Bank of Spain

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	6,467	5,145	5,627	6,938	9,555	11,017	11,418	7,888	8,943	8,811	9,941
Claims on non-euro residents denominated in foreign currency	3,856	7,498	8,379	12,307	14,040	25,020	26,593	25,612	32,296	40,577	49,834
Claims on EA residents denominated in foreign currency	1,177	2,579	8,941	0	0	4,251	2,577	2,175	2,800	3,858	4,934
ACB											
Claims on non-euro residents in €	913	4,974	2,929	1,015	907	844	813	402	307	306	-
Intra-Eurosystem Claims (BN adj)	29,835	4,787	4,787	5,447	5,585	5,724	5,862	5,861	6,436	6,436	6,436
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	21,866	71,374	92,577	90,088	61,550	168,196	361,087	195,170	143,889	135,353	146,006
Public Sector Purchase Programme	-	-	-	-	-	-	-	-	-	72,282	173,152
Claims on the Federal Government	7,416	5,832	5,249	4,665	4,082	3,499	2,915	1,943	972	-	-
Other claims on EA credit institutions in	-	2	2	1,152	2	3	1	4	2	2	0
SMP	-	-	-	-	7,383	24,476	24,469	21,751	17,894	15,844	13,733
CBPP	-	-	-	3,400	6,524	6,604	8,521	7,835	8,604	21,294	28,199
Other securities	29,396	69,697	75,904	80,940	73,921	75,306	63,941	58,626	61,741	51,677	36,095
CSPP	-	-	-	-	-	-	-	-	-	-	4,751
AO											
Items in Course of Settlement	3	1	1	0	1	1	1	2	1	2	1
Other assets	36,880	3,340	4,593	4,324	3,709	4,173	7,269	6,458	5,188	4,693	5,946
TOTAL ASSETS	**137,811**	**175,229**	**208,988**	**210,277**	**187,261**	**329,113**	**515,467**	**333,727**	**289,072**	**361,136**	**479,030**

Detailed Balance Sheet of the Central Bank of Spain (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Actual issue of notes	86,979	85,517	83,143	80,600	76,558	70,571	65,425	57,133	47,902	41,473	32,164
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	20,559	52,321	54,315	35,089	26,964	50,934	72,005	30,783	17,851	27,839	55,226
Other liabilities to EA credit institutions in Euro	-	-	-	0	0	0	110	1	0	210	0
Liabilities to other EA residents in Euro: General government	15,057	18,030	18,771	31,233	9,337	5,426	9,010	2,117	58	122	17,818
LCB											
Intra-Eurosystem liabilities	-	3,238	34,921	41,034	50,864	174,826	336,831	213,382	189,718	254,102	327,733
Liabilities equivalent to the transfer of foreign reserves	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to Target 2 and correspondent accounts (net)	-	3,238	34,921	41,034	50,864	174,826	336,831	213,382	189,718	254,102	327,733
Net liabilities re the allocation of euro banknotes within the ES	-	-	-	-	-	-	-	-	-	-	-
Liabilities related to other operational requirements	-	-	-	-	-	-	-	-	-	-	-
Equity											
Revaluation accounts	5,294	4,371	5,812	7,020	9,275	12,012	12,569	9,039	14,518	17,312	19,360
Capital and Reserve	1,500	2,000	2,000	2,000	1,950	1,950	1,950	1,900	1,900	1,900	1,900
Profit for the year	1,948	2,005	2,090	2,673	2,570	2,400	3,845	3,148	2,519	2,270	1,625
LO											
Other liabilities	6,475	7,747	7,936	10,628	9,743	10,994	13,722	16,226	14,606	15,908	23,204
TOTAL LIABILITIES	**137,811**	**175,229**	**208,988**	**210,277**	**187,261**	**329,113**	**515,467**	**333,727**	**289,072**	**361,136**	**479,030**

Detailed Balance Sheet of the European Central Bank

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFX											
Gold and gold receivables	9,930	10,280	10,664	12,355	17,016	19,644	20,359	14,064	15,980	15,795	17,820
Claims on non-euro residents denominated in foreign currency	29,728	29,022	41,611	35,456	39,714	41,428	41,323	39,391	44,400	49,745	51,137
Claims on EA residents denominated in foreign currency	2,774	3,868	22,226	3,294	4,327	4,828	2,838	1,271	1,784	1,863	2,473
ACB											
Claims on non-euro residents in €	4	25	629	-	1,800	1,456	-	535	-	-	-
Intra-Eurosystem Claims (BN adj)	3,546	17,241	234,096	6,360	-	49,393	24,674	-	-	-	-
ADOM											
Lending to EA credit institutions related to monetary policy operations denominated in euro	-	-	-	-	-	-	-	-	-	-	-
Other claims on EA credit institutions in	0	100	0	0	33	205	0	0	2	53	99
Securities	-	-	-	2,182	17,926	22,819	22,056	18,160	17,788	77,809	160,815
AO											
Items in Course of Settlement	-	-	-	-	-	-	-	-	-	-	-
Other assets	9,525	11,376	13,656	13,838	15,532	20,009	23,036	24,259	24,013	24,707	26,543
TOTAL ASSETS	**55,503**	**71,888**	**322,252**	**73,485**	**94,547**	**158,325**	**134,285**	**97,145**	**103,968**	**169,971**	**258,887**

Detailed Balance Sheet of the European Central Bank (continued)

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
LB											
Banknotes in Circulation	-	-	-	-	-	-	-	-	-	-	-
LDOM											
Liabilities to EA credit institutions re monetary policy operations in euro	1,065	1,050	1,020	1,056	1,105	1,261	1,024	1,054	1,020	1,026	2,912
Other liabilities to EA credit institutions in Euro	-	-	-	-	33	205	-	-	-	-	-
Liabilities to other EA residents in Euro	1,065	1,050	1,020	1,056	1,072	1,056	1,024	1,054	1,020	1,026	1,060
LCB											
Intra-Eurosystem liabilities	39,782	40,042	40,150	40,204	61,430	40,308	40,308	40,430	64,133	123,876	191,994
Equity											
Revaluation accounts	5,578	6,169	11,353	10,915	19,627	24,325	23,335	13,358	19,938	24,833	28,626
Capital and Reserve	4,089	4,127	4,137	4,142	5,306	6,484	7,650	7,653	7,697	7,740	7,740
Profit for the year	-	-	1,322	2,253	171	728	995	1,440	989	1,082	1,193
LO											
Other liabilities	4,992	20,525	264,900	14,914	8,709	86,675	60,973	33,745	10,192	11,414	26,422
TOTAL LIABILITIES	**55,507**	**71,913**	**322,881**	**73,485**	**96,347**	**159,781**	**134,285**	**97,680**	**103,968**	**169,971**	**258,887**

Appendix 6.9 **Simplified Balance Sheets – Pattipeilohy's Framework**

Simplified Balance Sheet – AUSTRIA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	11,910	14,509	26,857	14,266	19,419	25,984	23,127	19,358	23,369	23,108	25,280
L	12,151	12,695	22,533	20,914	9,744	12,389	17,894	8,922	14,553	18,534	16,124
G	3,701	5,052	5,872	9,761	15,261	17,393	15,188	15,445	14,918	25,794	41,816
ES_C	1,274	1,278	1,278	1,230	1,263	1,295	1,327	1,335	1,359	1,359	1,359
OA	8,665	9,726	13,710	8,527	9,161	9,488	9,877	10,252	9,964	9,957	9,018
TOTAL ASSETS	**37,701**	**43,261**	**70,250**	**54,699**	**54,847**	**66,549**	**67,414**	**55,313**	**64,163**	**78,752**	**93,597**

Simplified Balance Sheet – AUSTRIA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	1,138	-633	6,737	3,725	-3,427	-10,113	-18,658	-17,675	-2,427	-440	-66
Rs	4,474	6,548	15,692	15,513	11,699	20,801	23,228	14,938	12,636	21,532	27,446
Rg	5	11	9	62	68	8	203	216	181	840	3,370
ES_L	21,160	25,402	35,662	19,584	27,496	34,614	39,897	39,148	30,083	29,147	31,138
OL	10,925	11,932	12,149	15,816	19,011	21,239	22,742	18,686	23,691	27,673	31,709
TOTAL LIABILITIES	**37,701**	**43,261**	**70,250**	**54,699**	**54,847**	**66,549**	**67,413**	**55,313**	**64,163**	**78,752**	**93,597**

Simplified Balance Sheet – BELGIUM

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	10,769	12,136	47,674	17,438	21,132	31,494	24,149	20,303	22,067	22,933	23,639
L	39,910	56,312	57,967	42,261	9,169	42,530	42,009	17,464	13,871	13,013	33,004
G	4,479	5,109	15,176	14,321	17,134	21,287	20,963	19,890	19,289	32,938	54,307
ES_C	1,562	1,567	1,567	1,537	1,577	1,618	1,658	1,665	1,723	1,723	1,723
OA	3,814	13,297	8,013	7,205	7,211	14,432	7,288	5,899	5,869	6,513	8,849
TOTAL ASSETS	**60,535**	**88,421**	**130,397**	**82,762**	**56,224**	**111,361**	**96,067**	**65,221**	**62,819**	**77,119**	**121,523**

Simplified Balance Sheet – BELGIUM

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	-1,623	-1,806	2,071	7,087	8,375	11,988	15,421	17,995	20,408	23,240	26,815
Rs	7,928	17,789	10,934	15,003	13,018	22,570	19,572	13,798	10,763	25,397	50,825
Rg	46	45	58	108	82	65	296	126	49	38	35
ES_L	45,269	61,660	140,243	42,490	13,871	52,859	38,059	15,454	12,335	7,726	18,589
OL	8,914	10,733	13,091	18,075	20,878	23,878	22,718	17,848	19,264	20,718	25,258
TOTAL LIABILITIES	**60,535**	**88,421**	**130,397**	**82,762**	**56,224**	**111,361**	**96,067**	**65,221**	**62,819**	**77,119**	**121,523**

Simplified Balance Sheet – CYPRUS
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX			1,545	1,406	1,382	1,334	1,078	693	813	826	983
L			4,370	7,611	5,575	5,630	536	1,692	1,227	1,194	1,059
G			4,043	3,973	4,310	3,829	2,912	2,140	2,041	3,159	4,405
ES_C			95	106	108	110	112	109	127	2,500	5,973
OA			529	209	198	3,702	9,552	9,670	7,519	3,922	325
TOTAL ASSETS			**10,583**	**13,304**	**11,573**	**14,606**	**14,190**	**14,305**	**11,729**	**11,602**	**12,745**

Simplified Balance Sheet – CYPRUS
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN			1,232	1,301	1,205	1,048	779	2,190	2,201	1,738	1,124
Rs			1,292	3,101	2,289	3,173	3,984	2,773	4,141	7,210	9,087
Rg			448	445	270	924	257	928	1,239	862	718
ES_L			6,551	7,128	6,442	7,909	7,473	6,841	2,498	-	-
OL			1,059	1,329	1,367	1,551	1,697	1,572	1,650	1,792	1,816
TOTAL LIABILITIES			**10,583**	**13,304**	**11,573**	**14,606**	**14,190**	**14,305**	**11,729**	**11,602**	**12,745**

Simplified Balance Sheet – ESTONIA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX						168	250	269	425	465	446
L						2	46	37	80	88	99
G						542	533	465	418	1,482	3,385
ES_C						831	1,952	2,038	3,406	2,975	1,138
OA						56	55	52	48	56	72
TOTAL ASSETS						**1,600**	**2,836**	**2,861**	**4,376**	**5,066**	**5,141**

Simplified Balance Sheet – ESTONIA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN						639	703	839	922	1,058	1,219
Rs						466	1,528	1,417	2,800	3,331	3,192
Rg						-	-	-	-	-	-
ES_L						-	-	-	-	-	-
OL						495	605	605	654	676	731
TOTAL LIABILITIES						**1,600**	**2,836**	**2,861**	**4,376**	**5,066**	**5,141**

Simplified Balance Sheet – FINLAND
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	6,939	7,198	8,735	9,399	9,261	10,378	10,533	9,602	9,980	10,876	12,034
L	1,025	230	2,600	3,241	1,015	3,318	4,790	3,384	1,925	3,488	12,005
G	4,998	6,863	7,265	7,471	10,704	12,883	10,361	9,154	10,113	16,864	27,484
ES_C	1,948	3,741	5,987	10,335	20,507	66,850	71,133	23,017	20,621	20,993	22,730
OA	993	1,051	1,254	1,256	1,091	1,211	1,115	1,052	1,118	1,088	1,372
TOTAL ASSETS	**15,903**	**19,083**	**25,841**	**31,702**	**42,578**	**94,640**	**97,932**	**46,209**	**43,757**	**53,309**	**75,625**

Simplified Balance Sheet – FINLAND
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	6,481	7,424	8,358	9,385	10,466	11,164	11,796	12,231	12,831	13,687	14,613
Rs	3,766	5,910	8,110	13,543	21,696	71,697	73,799	23,803	20,308	27,559	47,665
Rg	-	-	3,009	14	262	836	801	55	2	79	31
ES_L	-	-	-	-	33	76	-	-	-	-	-
OL	5,656	5,752	6,365	8,758	10,118	10,879	11,540	10,120	10,618	11,987	13,316
TOTAL LIABILITIES	**15,903**	**19,083**	**25,841**	**31,702**	**42,578**	**94,640**	**97,932**	**46,209**	**43,757**	**53,309**	**75,625**

Simplified Balance Sheet – FRANCE

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	82,319	89,158	144,904	113,853	147,821	190,724	162,070	125,861	137,626	149,629	157,137
L	13,695	71,055	134,463	125,150	46,489	142,122	196,074	85,274	90,513	122,266	128,867
G	8,304	14,553	68,740	64,551	78,910	126,508	116,286	113,159	106,580	210,349	350,452
ES_C	19,995	9,454	9,750	9,276	9,492	10,046	10,318	10,143	10,083	9,929	9,958
OA	44,397	109,177	119,590	118,411	122,408	162,274	172,189	138,748	151,737	130,169	110,084
TOTAL ASSETS	**168,710**	**293,397**	**477,447**	**431,241**	**405,120**	**631,674**	**656,937**	**473,185**	**496,539**	**622,342**	**756,498**

Simplified Balance Sheet – FRANCE

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	56,777	61,540	69,290	76,363	80,909	88,584	95,796	101,932	108,299	112,759	119,846
Rs	26,396	73,738	90,982	61,138	46,331	172,875	190,758	107,000	109,970	219,812	332,742
Rg	235	309	13,045	19,005	1,487	8,937	4,883	3,266	2,438	13,869	13,882
ES_L	-	12,035	117,880	62,077	28,363	77,515	54,850	16,195	17,020	29,315	14,123
OL	85,300	145,773	186,250	212,656	248,030	283,763	310,648	244,791	258,811	246,587	275,802
TOTAL LIABILITIES	**168,710**	**293,397**	**477,447**	**431,241**	**405,120**	**631,674**	**656,937**	**473,185**	**496,539**	**622,342**	**756,498**

Simplified Balance Sheet – GERMANY

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	85,065	99,896	162,747	130,254	162,100	202,731	191,972	143,879	158,745	159,532	177,991
L	256,348	267,955	277,424	231,502	118,406	71,642	90,010	65,499	82,173	98,474	131,360
G	4,440	4,440	4,440	9,716	25,255	60,461	55,010	46,840	38,063	136,337	296,254
ES_C	18,273	83,950	128,554	189,706	337,851	475,894	667,895	523,370	473,007	596,929	766,912
OA	9,410	27,432	39,395	26,867	27,647	26,914	20,421	21,447	18,854	20,700	20,497
TOTAL ASSETS	**373,536**	**483,673**	**612,560**	**588,045**	**671,259**	**837,642**	**1,025,308**	**801,035**	**770,842**	**1,011,972**	**1,393,014**

Simplified Balance Sheet – GERMANY

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	255,215	283,279	328,379	348,110	366,720	391,753	427,539	461,509	508,432	552,630	592,169
Rs	47,956	109,513	166,939	112,163	146,432	228,872	299,962	141,459	90,195	208,741	411,816
Rg	36	43	170	9,987	173	745	11,870	2,013	1,940	11,647	32,458
ES_L	-	-	-	-	-	-	-	-	-	-	-
OL	70,328	90,839	117,075	117,782	157,937	216,272	285,937	196,052	170,275	238,953	356,573
TOTAL LIABILITIES	**373,535**	**483,674**	**612,563**	**588,042**	**671,262**	**837,642**	**1,025,308**	**801,033**	**770,842**	**1,011,971**	**1,393,016**

Simplified Balance Sheet – GREECE

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	3,899	4,758	6,531	5,023	6,299	7,771	7,322	5,528	6,891	7,316	8,045
L	4,795	8,727	38,355	50,329	99,255	77,526	20,694	64,419	57,861	43,253	28,873
G	15,043	18,750	22,307	27,288	29,142	26,443	25,606	25,828	34,484	39,954	57,631
ES_C	1,454	1,444	1,483	1,598	1,600	1,633	1,814	1,743	1,774	1,782	1,854
OA	9,734	8,982	2,244	2,355	2,346	55,064	104,343	11,977	2,147	71,209	45,981
TOTAL ASSETS	**34,925**	**42,661**	**70,920**	**86,594**	**138,641**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Simplified Balance Sheet – GREECE

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	16,907	18,669	20,776	20,972	29,670	41,395	38,036	35,480	32,356	48,383	43,243
Rs	4,552	7,141	7,794	8,008	10,528	4,703	2,169	1,959	3,076	1,387	907
Rg	894	1,159	1,521	1,333	782	3,838	5,721	6,943	3,521	3,749	8,270
ES_L	8,184	10,797	35,348	49,036	87,133	104,808	98,355	51,116	49,319	94,387	72,257
OL	4,389	4,895	5,482	7,244	10,527	13,692	15,497	13,997	14,886	15,607	17,707
TOTAL LIABILITIES	**34,925**	**42,661**	**70,920**	**86,594**	**138,640**	**168,436**	**159,778**	**109,495**	**103,158**	**163,513**	**142,384**

Simplified Balance Sheet – IRELAND

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	3,961	2,630	7,044	2,847	2,610	3,721	3,019	2,702	3,588	4,836	6,057
L	27,044	39,449	93,412	93,390	132,876	108,122	71,889	39,665	21,579	13,064	10,700
G	7,137	9,884	14,222	14,390	17,370	19,845	20,311	63,198	54,217	57,302	63,973
ES_C	570	569	585	796	779	808	886	857	895	885	890
OA	1,540	997	868	13,472	50,854	43,751	41,381	1,688	1,029	1,148	1,166
TOTAL ASSETS	**40,253**	**53,529**	**116,132**	**124,896**	**204,489**	**176,247**	**137,486**	**108,110**	**81,308**	**77,235**	**82,786**

Simplified Balance Sheet – IRELAND

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	16,842	20,258	23,323	25,520	27,289	28,414	29,269	30,528	31,534	32,686	33,965
Rs	12,915	21,839	19,447	14,908	11,414	6,029	3,518	3,243	4,055	10,018	19,225
Rg	5,463	8,025	25,817	26,260	15,888	15,572	19,636	10,261	6,811	13,718	10,403
ES_L	2,545	595	44,364	53,519	145,185	120,434	79,259	55,117	22,745	3,039	952
OL	2,488	2,811	3,181	4,686	4,713	5,798	5,804	8,962	16,163	17,775	18,241
TOTAL LIABILITIES	**40,253**	**53,529**	**116,132**	**124,896**	**204,489**	**176,247**	**137,486**	**108,110**	**81,308**	**77,235**	**82,786**

Simplified Balance Sheet – ITALY
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	64,390	69,123	82,603	93,862	120,992	136,935	141,232	107,802	119,890	122,654	131,898
L	20,957	28,070	50,344	32,171	57,696	219,834	282,709	244,820	206,605	188,224	246,408
G	20,229	18,098	59,173	63,487	91,985	121,891	120,126	117,063	119,881	191,949	299,299
ES_C	30,845	43,744	31,392	63,211	11,843	8,352	8,560	8,596	8,467	8,467	8,467
OA	82,136	85,341	43,918	48,525	50,445	51,966	53,742	63,259	53,412	43,813	52,347
TOTAL ASSETS	**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**606,369**	**541,540**	**508,256**	**555,107**	**738,420**

Simplified Balance Sheet – ITALY
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	119,728	128,458	139,472	143,198	145,417	153,564	146,343	144,674	142,159	142,027	145,955
Rs	17,159	42,623	35,441	34,313	22,740	33,878	27,665	20,797	15,436	24,138	71,984
Rg	22,945	9,716	19,413	31,027	42,488	23,529	33,802	27,117	7,859	4,821	9,780
ES_L	-	-	-	-	-	190,899	253,799	228,382	208,576	248,547	355,667
OL	58,725	63,580	73,104	92,718	122,315	137,108	144,759	120,570	134,226	135,574	155,034
TOTAL LIABILITIES	**218,557**	**244,376**	**267,431**	**301,256**	**332,961**	**538,978**	**606,369**	**541,540**	**508,256**	**555,107**	**738,420**

Simplified Balance Sheet – LATVIA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX									3,353	3,868	3,830
L									86	264	257
G									1,095	3,015	6,320
ES_C									279	307	293
OA									97	169	170
TOTAL ASSETS									**4,910**	**7,624**	**10,870**

Simplified Balance Sheet – LATVIA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN									734	497	247
Rs									2,424	4,793	4,192
Rg									51	38	47
ES_L									797	1,312	5,292
OL									904	983	1,091
TOTAL LIABILITIES									**4,910**	**7,624**	**10,870**

Simplified Balance Sheet – LITHUANIA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX										2,994	3,150
L										346	303
G										3,424	6,837
ES_C										739	500
OA										77	117
TOTAL ASSETS										**7,580**	**10,907**

Simplified Balance Sheet – LITHUANIA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN										2,209	2,525
Rs										2,867	2,481
Rg										1,273	690
ES_L										-	3,590
OL										1,230	1,621
TOTAL LIABILITIES										**7,580**	**10,907**

Simplified Balance Sheet – LUXEMBOURG
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	1,539	2,699	13,346	2,234	2,291	6,463	3,614	3,087	4,342	3,572	3,065
L	41,511	32,915	40,080	15,201	2,907	5,328	5,792	5,880	3,484	4,060	5,476
G	2,350	2,085	3,728	3,865	3,866	4,065	3,320	2,893	3,143	3,091	4,085
ES_C	5,315	18,399	42,168	52,573	68,000	109,438	105,883	103,670	105,220	147,672	187,320
OA	1,732	2,911	1,323	3,177	2,656	1,913	1,812	3,030	909	563	904
TOTAL ASSETS	**52,446**	**59,009**	**100,645**	**77,049**	**79,720**	**127,206**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Simplified Balance Sheet – LUXEMBOURG
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	41,081	46,201	52,622	60,560	66,910	72,034	76,352	87,526	93,492	95,494	96,590
Rs	9,742	10,780	45,532	13,489	9,642	51,223	38,479	24,565	16,664	57,237	97,433
Rg	473	434	387	344	348	502	553	576	579	559	843
ES_L	-	-	-	-	-	-	-	-	-	-	-
OL	1,150	1,596	2,104	2,656	2,820	3,447	5,037	5,893	6,364	5,668	5,984
TOTAL LIABILITIES	**52,446**	**59,009**	**100,645**	**77,049**	**79,720**	**127,206**	**120,420**	**118,560**	**117,098**	**158,958**	**200,851**

Simplified Balance Sheet – MALTA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX			951	714	758	856	1,132	1,176	1,466	1,635	1,816
L			454	1,253	1,075	498	378	200	411	115	55
G			475	626	1,056	1,368	1,305	1,436	1,400	1,477	1,628
ES_C			47	48	49	50	51	52	53	53	1,072
OA			795	603	705	785	737	746	995	1,225	966
TOTAL ASSETS			**2,723**	**3,244**	**3,644**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Simplified Balance Sheet – MALTA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN			748	768	806	868	848	841	867	974	1,034
Rs			483	585	501	1,101	1,474	1,144	499	1,457	2,917
Rg			362	393	390	421	247	300	297	271	654
ES_L			667	814	1,225	428	200	672	1,927	920	-
OL			463	684	722	740	834	654	736	883	931
TOTAL LIABILITIES			**2,723**	**3,244**	**3,644**	**3,558**	**3,603**	**3,610**	**4,326**	**4,506**	**5,536**

Simplified Balance Sheet – NETHERLANDS
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	19,386	21,114	34,679	28,959	35,280	40,424	41,585	33,596	36,218	35,747	36,179
L	11,089	45,961	34,815	39,228	5,810	6,690	27,894	11,659	14,029	22,161	28,152
G	4,775	8,611	12,258	12,051	14,209	24,740	23,180	27,331	25,005	47,366	85,500
ES_C	12,384	2,478	2,478	17,883	42,850	155,179	122,626	48,477	22,250	57,410	89,352
OA	11,064	12,662	14,999	13,199	12,324	12,265	8,538	3,151	2,828	3,023	3,694
TOTAL ASSETS	**58,698**	**90,826**	**99,229**	**111,320**	**110,473**	**239,298**	**223,823**	**124,214**	**100,330**	**165,707**	**242,877**

Simplified Balance Sheet – NETHERLANDS
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	23,793	23,590	23,818	22,478	21,208	19,322	17,287	15,847	13,598	11,961	11,480
Rs	13,662	21,528	29,372	57,902	50,000	175,606	158,038	73,938	49,943	114,399	171,104
Rg	11	4	24	26	99	5	7	47	192	85	1,366
ES_L	-	21,949	18,814	-	-	-	-	-	-	-	-
OL	21,232	23,755	27,201	30,913	39,166	44,366	48,491	34,382	36,597	39,262	58,927
TOTAL LIABILITIES	**58,698**	**90,826**	**99,229**	**111,320**	**110,473**	**239,298**	**223,823**	**124,214**	**100,330**	**165,707**	**242,877**

Simplified Balance Sheet – PORTUGAL

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	10,372	12,513	9,218	12,788	18,129	17,515	18,133	13,634	16,849	18,407	24,647
L	161	2,464	10,210	16,709	42,287	47,411	54,109	49,022	32,503	29,507	25,497
G	6,583	5,331	8,544	7,443	12,168	14,515	13,491	12,860	16,572	26,026	42,293
ES_C	1,088	1,101	1,158	1,185	1,152	1,198	1,322	1,273	1,252	1,235	1,309
OA	4,787	4,956	5,866	6,453	6,972	7,308	7,326	6,605	6,513	6,645	6,334
TOTAL ASSETS	**22,990**	**26,366**	**34,996**	**44,578**	**80,707**	**87,947**	**94,381**	**83,394**	**73,688**	**81,819**	**100,081**

Simplified Balance Sheet – PORTUGAL

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	4,516	3,041	1,575	663	333	-1,369	-4,022	-5,895	-8,621	-10,394	-11,976
Rs	5,074	9,266	5,402	8,771	4,921	5,691	8,136	8,218	3,589	7,712	5,649
Rg	0	0	0	2	1	4,743	5,223	7,629	7,830	5,593	11,845
ES_L	6,601	6,206	18,953	23,436	59,921	60,964	66,026	59,565	54,638	61,705	71,588
OL	6,799	7,853	9,067	11,705	15,529	17,918	19,018	13,876	16,252	17,203	22,975
TOTAL LIABILITIES	**22,990**	**26,366**	**34,996**	**44,578**	**80,707**	**87,947**	**94,381**	**83,394**	**73,688**	**81,819**	**100,081**

Simplified Balance Sheet – SLOVAKIA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX				3,823	4,636	5,249	4,613	4,526	6,834	6,154	5,464
L				2,331	1,559	1,816	2,433	716	1,108	2,269	2,980
G				9,928	10,485	11,996	9,261	7,340	5,622	7,209	12,862
ES_C				594	605	617	1,606	3,378	3,007	1,231	711
OA				5,884	6,469	6,651	6,635	6,117	5,536	5,358	5,339
TOTAL ASSETS				**22,560**	**23,754**	**26,329**	**24,547**	**22,076**	**22,109**	**22,222**	**27,355**

Simplified Balance Sheet – SLOVAKIA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN				4,646	5,947	7,241	8,163	8,701	9,357	10,058	10,854
Rs				1,237	1,766	975	6,325	4,245	5,353	6,263	4,664
Rg				0	0	1	2,607	2,723	1,001	0	744
ES_L				14,500	13,306	13,600	-	76	-	-	5,042
OL				2,178	2,736	4,512	7,452	6,332	6,397	5,900	6,050
TOTAL LIABILITIES				**22,560**	**23,754**	**26,329**	**24,547**	**22,076**	**22,109**	**22,222**	**27,355**

Simplified Balance Sheet – SLOVENIA
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX		2,296	2,083	1,874	1,827	1,797	1,772	1,660	1,996	2,063	2,181
L		156	1,198	2,200	868	1,913	4,105	3,402	1,286	1,581	1,709
G		2,103	2,442	2,857	2,830	3,271	3,651	2,931	2,364	4,320	7,279
ES_C		241	239	248	253	259	264	264	2,686	542	282
OA		1,228	965	304	309	501	276	605	435	341	542
TOTAL ASSETS		**6,025**	**6,926**	**7,483**	**6,087**	**7,741**	**10,068**	**8,861**	**8,767**	**8,847**	**11,993**

Simplified Balance Sheet – SLOVENIA
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN		565	817	991	1,166	1,366	1,372	2,184	2,527	3,485	4,412
Rs		409	994	1,234	896	1,141	1,338	2,082	1,442	1,632	2,252
Rg		341	268	271	270	872	1,023	1,714	2,718	1,730	1,949
ES_L		3,491	3,556	3,334	2,093	2,728	4,409	1,024	-	-	1,223
OL		1,219	1,291	1,653	1,662	1,634	1,926	1,856	2,079	2,001	2,157
TOTAL LIABILITIES		**6,025**	**6,926**	**7,483**	**6,087**	**7,741**	**10,068**	**8,861**	**8,767**	**8,847**	**11,993**

Simplified Balance Sheet – SPAIN
Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	12,413	20,196	25,876	20,260	24,503	41,132	41,401	36,077	44,346	53,553	64,710
L	21,866	71,374	92,577	93,488	68,074	174,800	369,608	203,005	152,493	156,647	178,956
G	36,812	75,529	81,153	85,606	85,386	103,280	91,325	82,320	80,606	139,803	222,981
ES_C	29,835	4,787	4,787	5,447	5,585	5,724	5,862	5,861	6,436	6,436	6,436
OA	36,885	3,343	4,596	5,476	3,712	4,177	7,271	6,464	5,191	4,697	5,947
TOTAL ASSETS	**137,811**	**175,229**	**208,988**	**210,277**	**187,261**	**329,113**	**515,467**	**333,727**	**289,072**	**361,136**	**479,030**

Simplified Balance Sheet – SPAIN
Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	86,979	85,517	83,143	80,600	76,558	70,571	65,425	57,133	47,902	41,473	32,164
Rs	20,559	52,321	54,315	35,089	26,964	50,934	72,115	30,784	17,852	28,049	55,227
Rg	15,057	18,030	18,771	31,233	9,337	5,426	9,010	2,117	58	122	17,818
ES_L	0	3,238	34,922	41,034	50,864	174,826	336,831	213,382	189,718	254,103	327,733
OL	15,216	16,123	17,837	22,322	23,538	27,357	32,086	30,311	33,542	37,390	46,088
TOTAL LIABILITIES	**137,811**	**175,229**	**208,988**	**210,277**	**187,261**	**329,113**	**515,357**	**333,726**	**289,072**	**360,926**	**479,029**

Simplified Balance Sheet – EUROPEAN CENTRAL BANK

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	42,436	43,196	75,129	51,105	62,856	67,355	64,520	55,261	62,164	67,403	71,430
L	-	-	-	-	-	-	-	-	-	-	-
G	-	-	-	2,182	17,926	22,819	22,056	18,160	17,788	77,809	160,815
ES_C	3,546	17,241	234,096	6,360	-	49,393	24,674	-	-	-	-
OA	9,525	11,476	13,656	13,838	15,565	20,214	23,036	24,259	24,016	24,760	26,641
TOTAL ASSETS	**55,507**	**71,913**	**322,881**	**73,485**	**96,347**	**159,781**	**134,285**	**97,680**	**103,968**	**169,971**	**258,887**

Simplified Balance Sheet – EUROPEAN CENTRAL BANK

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	-	-	-	-	-	-	-	-	-	-	-
Rs	-	-	-	-	33	205	-	-	-	-	1,852
Rg	1,065	1,050	1,020	1,056	1,072	1,056	1,024	1,054	1,020	1,026	1,060
ES_L	39,782	40,042	40,150	40,204	61,430	40,308	40,308	40,430	64,133	123,876	191,994
OL	14,660	30,821	281,712	32,224	33,812	118,213	92,953	56,197	38,815	45,069	63,982
TOTAL LIABILITIES	**55,507**	**71,913**	**322,881**	**73,485**	**96,347**	**159,781**	**134,285**	**97,680**	**103,968**	**169,971**	**258,887**

Simplified Balance Sheet – EUROSYSTEM^

Pattipeilohy's Framework

Assets (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FX	354,752	401,411	631,038	509,742	640,946	791,662	741,253	584,793	660,725	697,308	759,716
L	450,541	637,178	860,312	778,672	607,620	925,468	1,194,519	809,388	703,341	748,589	893,742
G	116,973	181,045	308,634	336,041	431,496	590,790	547,594	560,950	543,980	996,549	1,703,490
ES_C	-	-	-	-	-	-	-	-	-	-	-
OA	227,764	288,252	275,122	278,570	322,148	425,350	479,346	318,135	300,194	338,100	305,951
TOTAL ASSETS	**1,150,030**	**1,507,886**	**2,075,106**	**1,903,025**	**2,002,210**	**2,733,270**	**2,962,712**	**2,273,266**	**2,208,240**	**2,780,546**	**3,662,899**

Simplified Balance Sheet – EUROSYSTEM

Pattipeilohy's Framework

Liabilities (€mn)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BN	628,238	676,678	762,921	806,522	839,702	888,676	912,592	956,185	1,016,616	1,083,539	1,126,216
Rs	174,116	379,309	492,638	395,954	380,816	851,900	932,074	476,169	371,146	773,619	1,322,691
Rg	45,166	38,115	83,282	120,495	71,685	65,590	95,341	65,871	36,738	59,295	114,880
ES_L	-	-	-	-	-	-	-	-	-	-	-
OL	302,510	413,784	736,268	580,053	710,008	927,104	1,022,607	775,060	783,739	864,092	1,099,113
TOTAL LIABILITIES	**1,150,030**	**1,507,886**	**2,075,109**	**1,903,024**	**2,002,211**	**2,733,270**	**2,962,614**	**2,273,285**	**,208,239**	**2,780,545**	**3,662,900**

^Eurosystem is defined as published by the ECB in its Annual Report. For purposes of applying PF, defining Eurosystem as ESTA gives the same results given that the main difference concerns ES_C and ES_L which are not taken into account in this analysis.

Appendix 6.10

Notes explaining the reasons why some EANCBs do not feature in Figures in Chapter 6:

1. The central banks of Malta and Slovenia were excluded from the analysis since they constitute a low percentage of the Eurosystem.

2. The central banks of Latvia and Lithuania were excluded from the analysis since they joined the Eurosystem only very recently – Latvia (2014) and Lithuania (2015).

3. **Figure 6.1:** EE is not taken into account because of relatively very low domestic assets such that the ratio CB/Dom is abnormally high. On the other hand, SK is also not taken into account because of very high cross-border assets, which render the ratio A_{CB}/A_{Dom} to be abnormally high. LU is an outlier because of very low A_{FX} such that the ratio $(A_{CB}+A_{DOM})/A_{FX}$ is abnormally high.

4. **Figure 6.3:** LU is an outlier because cross-border liabilities are zero. These consisted of only one item related to the allocation of euro banknotes, which was not taken into account due to the adjustment explained in Chapter 3 and Chapter 6. AT is excluded from this figure because of negative banknotes in circulation (refer to the compilation of this data presented in Chapter 3).

5. **Figure 6.7:** SK is left out of the analysis because G is abnormally high and therefore the ratio G/L is high.

6. **Figure 6.9:** AT, SK, LU, PT and EE are outliers because Rg is zero or close to zero.

References

Ademuyiwa, I, Siklos, P L and St. Amand, S 2018, 'Central bank balance sheets and the interaction between monetary policy and financial stability', *Centre for International Governance Innovation Papers* no. 193.

Adler, G, Castro, P and Tovar, C E 2012, 'Does central bank capital matter for monetary policy? *International Monetary Fund Working Papers*, WP no. 12/60.

Af Jochnick, K 2015, 'Does the Riksbank have to make a profit? Challenges for the funding of the Riksbank', Speech at the Swedish House of Finance, Stockholm, transcript *Sveriges Riksbank*, 23 January.

Auer, R A 2012, 'What drives Target2 balances? Evidence from a panel analysis', *Swiss National Bank Working Papers*, no. 2012-15.

Bagus, P 2010, *The Tragedy of the Euro*, 2nd edn., Ludwig von Mises Institute, USA.

Bagus, P and Howden, D 2009a, 'Qualitative easing in support of a tumbling financial system: a look at the Eurosystem's recent balance sheet policies', *Economic Affairs,* vol. 29, no. 4, pp. 60-65.

Bagus, P and Howden, D 2009b, 'The Federal Reserve and Eurosystem's balance sheet policies during the financial crisis: a comparative analysis', *MPRA Paper*, no. 79588, University Library of Munich, Germany.

Bagus, P and Howden, D 2016, 'Central bank balance sheet analysis', *MPRA Paper,* no. 79801, University Library of Munich, Germany.

Bagus, P and Schiml, M H 2009, 'New modes of monetary policy: qualitative easing by the Fed', *Economic Affairs*, vol. 29 no. 2, pp. 46-49.

Baldo, L, Hallinger, B, Helmus, C, Herrala, N, Martins, D, Mohing F, Petroulakis, F, Resinek, M, Vergote, O, Usciati, B, Wang, Y, 2017, 'The distribution of excess liquidity in the Euro area', *ECB Occasional Paper Series*, no. 200/Nov, European Central Bank.

Bauer, M D and Rudebusch, G D 2014, 'The signaling channel for Federal Reserve bond purchases', *International Journal of Central Banking*, vol. 10, no 3, pp 233-289.

Bernanke, B, Gertler, M and Gilchrist, S 1999, 'The financial accelerator in a quantitative business cycle framework', in J B Taylor and M Woodford (eds.) *Handbook of Macroeconomics*, Vol. 1C, Elsevier Science, Amsterdam, pp1341-1393.

Bernanke, B, and Reinhart, V 2004, 'Conducting monetary policy at very low short-term interest rates', *American Economic Review*, 94(2): 85-90.

Bholat, D and Darbyshire, R 2016, 'Accounting in central banks', *Staff Working Paper* no. 604, Bank of England, viewed on 3 December 2018, <https://ssrn.com/abstract=2783744>

Bibow, J 2018, 'Unconventional monetary policies and central bank profits: seigniorage as fiscal revenue in the aftermath of the global financial crisis', *IMK Macroeconomic Policy Institute Study*, no. 62.

Bijlsma, M and Lukkezen, J 2012, 'Target 2 of the ECB vs. Interdistrict settlement account of the Federal Reserve', Blog Post, March 6, 2012, accessed on 5 August 2019, <https://bruegel.org/2012/03/target-2-of-the-ecb-vs-interdistrict-settlement-account-of-the-federal-reserve/>

Bindseil, U 2004, *Monetary policy implementation – theory, past and present*, Oxford University Press, New York.

Bindseil, U 2014, *Monetary policy operations and the financial system*, Oxford University Press, New York.

Bindseil, U and König, P 2011, 'The economics of Target2 balances,' *SFB 649* Working Paper, no. 35, Humboldt University, Berlin, <http://sfb649.wiwi.hu-berlin.de/papers/pdf/SFB649DP2011-035.pdf>

Bindseil, U and König, P 2012, 'Target2 and the European sovereign debt crisis', Kredit and Kapital 45(2), pp135-174.

Bindseil, U, Manzanares, A and Weller, B 2004, 'The role of central bank capital revisited', *ECB Working Paper Series,* no.392.

Bini Smaghi, L and Gros, D 2000, *Open issues in European central banking*, Macmillan Press Ltd., London.

Borio, C and Disyatat, P 2009, 'Unconventional monetary policies: an appraisal', *Bank for International Settlements*, Working Paper no. 292.

Brione, P 2004, 'The role of central bank capital' CentralBankNet, <https://www.centralbanking.com/central-banking/news/1419904/the-role-central-bank-capital>

Buiter, W 2008, 'Can central banks go broke?' *Centre for Economic Policy Research,* Policy Insight no. 24, viewed on 4 August, 2018 <https://ssrn.com/abstract =2489665>

Buiter, W 2015, 'The Euro area: Monetary union or system of currency boards?' *Global Economics View*, Citigroup Global Markets Inc., 19 March 2015.

Buiter, W and Rahbari, E 2012a, 'The ECB as lender of last resort for sovereigns in the Euro area', *Centre for Economic Policy Research,* Discussion Paper no. 8974, viewed on 3 February, 2014 <https://ssrn.com/abstract=2066345>

Buiter, W and Rahbari, E 2012b, 'Looking into the deep pockets of the ECB', *Global Economics View*, Citigroup Global Markets Inc., 27 February 2012.

Buiter, W and Rahbari, E 2012c, 'Target2 redux: the simple accountancy and slightly more complex economics of Bundesbank loss exposure through the Eurosystem', *Centre for Economic Policy Research,* Discussion Paper no. 9211, viewed on 5 February 2014, <https://ssrn.com/abstract=2210160>

Buiter, H and Rahbari, E 2012d, 'Why does the ECB not put its mouth where its money is? The ECB as lender of last resort for Euro area sovereigns and banks,' *Global Economics View,* Citigroup Global Markets Inc. 27 February 2012.

Buiter, W, Rahbari E and Michels, J 2011, 'The implications of intra-Euro Area imbalances in credit flows', *Centre for Economic Policy Research,* Policy Insight no. 57.

Borio, C 2001, 'A hundred ways to skin a cat: Comparing monetary policy operating procedures in the United States, Japan and the Euro area', *BIS Paper*, no. 9.

Canuto, O and Cavallari, M 2017, 'The Mist of Central Bank Balance Sheets', *OCP Policy Center*, Policy Brief, PF 17/07.

Caruana, J 2011, 'Why central bank balance sheets matter', BIS Papers Chapter in Bank for International Settlements (ed.) *Are central bank balance sheets in Asia too large?*, vol. 66, pp 2-9.

Castillo, S and Varela, C 2017, 'Target2 Imbalances are rising, should we worry?' *Global Flash*, BBVA Research, 31 January 2017, viewed on 5 January 2018, <https://www.bbvaresearch.com/wpcontent/uploads/2017/01/Target2_20170130VF.pdf>

Cecchetti, S G 2009, 'Crisis and responses: The Federal Reserve in the early stages of the financial crisis', *Journal of Economic Perspectives*, 23(1) pp 51-75.

Cecchetti, S G and Schoenholtz, K L 2015, *Do central banks need capital?* accessed on 7 March 2017, <https://www.moneyandbanking.com/commentary/2015/5/26/do-central-banks-need-capital>

Cecchetti, S G 2018, *Target2 balances mask reduced financial fragmentation in the Euro Area,* accessed on 11 January 2019, <https://www.moneyandbanking.com/commentary/2018/7/8/target2-balances-mask-reduced-financial-fragmentation-in-the-euro-area>

Cecchetti S. G, Mc Cauley R. N and Mc Guire, P 2012, 'Interpreting Target2 balances', *BIS Working Papers* no. 393.

Cecioni, M and Ferrero, G 2012, 'Determinants of Target2 imbalances', *Questioni di Economia e Finanza Occasional Papers,* no. 136, Bank of Italy.

Cecioni, M, Ferrero, G and Secchi, A 2011, Unconventional monetary policy in theory and in practice', *Questioni di Economia e Finanza Occassional Papers*, no. 102, Bank of Italy.

Central Bank of Austria, Annual Reports for the 2006-2016 period, retrieved from <https://www.oenb.at/en/Publications/Oesterreichische-Nationalbank/Annual-Report.html>

Central Bank of Belgium, Annual Reports for the 2006-2016 period, retrieved from <https://www.nbb.be/en/publications-and-research/annual-reports>

Central Bank of Cyprus, Annual Reports for the 2006-2016 period, retrieved from <https://www.centralbank.cy/en/publications/annual-report>

Central Bank of Estonia, Annual Reports for the 2006-2016 period, retrieved from <https://www.eestipank.ee/en/publications/series/annual-report>

Central Bank of Finland, Annual Reports for the 2006-2016 period, retrieved from <https://www.suomenpankki.fi/en/media-and-publications/publications/annual-report/>

Central Bank of France, Annual Reports for the 2006-2016 period, retrieved from <https://www.banque-france.fr/en/liste-chronologique/banque-de-france-annual-report>

Central Bank of Germany, Annual Reports for the 2006-2016 period, retrieved from <https://www.bundesbank.de/en/publications/reports/annual-reports>

Central Bank of Greece, Annual Reports for the 2006-2016 period, retrieved from <https://www.bankofgreece.gr/en/publications-and-research/publications /publications-list>

Central Bank of Ireland, Annual Reports for the 2006-2016 period, retrieved from <https://centralbank.ie/publication/corporate-reports/annual-reports>

Central Bank of Italy, Annual Reports for the 2006-2016 period, retrieved from <https://www.bancaditalia.it/pubblicazioni/relazione-annuale/index.html?com. dotmarketing.htmlpage.language=1>

Central Bank of Latvia, Annual Reports for the 2006-2016 period, retrieved from <https://www.bank.lv/en/about-us/reports/annual-report>

Central Bank of Luxembourg, Annual Reports for the 2006-2016 period, retrieved from <http://www.bcl.lu/en/publications/Annual-reports/index.html>

Central Bank of Malta, Annual Reports for the 2006-2016 period, retrieved from <https://www.centralbankmalta.org/annual-reports>

Central Bank of Netherlands, Annual Reports for the 2006-2016 period, retrieved from <https://www.dnb.nl/en/news/dnb-publications/annual-report/index.jsp>

Central Bank of Portugal, Annual Reports for the 2006-2016 period, retrieved from <https://www.bportugal.pt/en/publications/banco-de-portugal/all/112>

Central Bank of Slovakia, Annual Reports for the 2006-2016 period, retrieved from <https://www.nbs.sk/en/publications-issued-by-the-nbs/annual-report>

Central Bank of Slovenia, Annual Reports for the 2006-2016 period, retrieved from <https://www.bsi.si/en/publications/annual-report>

Central Bank of Spain, Annual Reports for the 2006-2016 period, retrieved from <https://www.bde.es/bde/en/secciones/informes/Publicaciones_an/Informe_anual/>

Christensen, J H E, Lopez, J A and Rudebusch, G D 2013, 'A probability-based stress test of Federal Reserve assets and income', *Working Paper Series*, 2013-38, Federal Reserve Bank of San Francisco.

Coeure, B 2012, 'Challenges to the single monetary policy and the ECB's response', Speech at the Institut d'etudes politiques, 20 September, Paris.

Cour-Thimann, P 2013, 'Target balances and the crisis in the Euro area', *CESIFO Forum*, vol 14, Special Issue, April.

Cour-Thimann, P 2014, 'Monetary policy and redistribution: information from central bank balance sheets in the Euro area and the US,' *Review of Economics*, De Gruyter vol. 64(3), pp 293-324.

Cour-Thimann, P and Winkler, B 2012, 'The ECB's non-standard monetary policy measures: the role of institutional factors and financial structure', *Oxford Review of Economic Policy*, 28(4): 765-803.

Cross, M, Fisher, P and Weeken, O 2010, The Bank's balance sheet during the crisis', *Bank of England Quarterly Bulletin*, vol. 50, no. 1 pp 34-42.

Cukierman, A 2011, 'Central bank finances and independence – How much capital should a central bank have?' in S. Milton and P. Sinclair (eds.) *The capital needs of central banks*, Routledge, London.

Cukierman, A 2013, 'Monetary policy and institutions before, during and after the global financial crisis', *Journal of Financial Stability*, vol. 9(3), pp 373-384.

Curdia, V and Woodford, M 2011, 'The central bank balance sheet as an instrument of monetary policy', *Journal of Monetary Economics*, vol. 58, no. 1, pp 54-79.

De Grauwe, P and Ji, Y 2012, 'What Germany should fear most is its own fear: an analysis of Target2 and current account imbalances', *CEPS Working Documents*, no. 368, September, accessed on 5 December 2013 <https://ssrn.com/abstract=2145926>

Donnery, S, Doran, D, Gleeson, R and Carroll, K 2017, 'Non-standard monetary policy measures and the balance sheets of Eurosystem central banks,' *Quarterly Bulletin* 03, Central Bank of Ireland, pp 79-94, July.

Dor, E 2016, 'Explaining the surge of Target2 liabilities in Italy: less simple than the ECB's narrative', IESEG School of Management, October, accessed on 19 July 2017, <https://ssrn.com/abstract=2860545>

Durre, A and Pill, H 2010, 'Non-standard monetary policy measures, monetary financing and the price level', paper presented at the ECB Conference on Monetary and Fiscal Policy Challenges in Times of Financial Stress.

Dullien, S and Schieritz, M 2012, 'German savers should applaud the growing Target balances', VoxEU.org, 7 May. <https://voxeu.org/article/german-savers-should-applaud-growing-target-balances>

EEAG 2012, 'The EEAG report on the European economy 2012', CESifo, Munich.

Eisner, E, Martin, A and Sovik, Y 2016, 'What is the composition of central bank balance sheets in normal times?' *Liberty Street Economics*, Federal Reserve Bank of New York. Accessed on 14 November 2017, <https://libertystreeteconomics.newyorkfed.org/2016/02/what-is-the-composition-of-central-bank-balance-sheets-in-normal-times.html>

Eggertson, G and Woodford, M 2003, 'The zero bound on interest rates and optimal monetary policy', *Brookings Papers on Economic Activity*, Economic Studies Program, The Brookings Institution, vol. 34(1), pp 139-235

Ernhagen, T, Vesterlund, M and Viotti, S 2002, 'How much equity does a central bank need?' *Economic Review*, 2/2002, Sveriges Riksbank.

European Central Bank, 2009, 'Recent Developments in the Balance Sheets of the Eurosystem, the Federal Reserve System and the Bank of Japan', *ECB Monthly Bulletin*, October 2009, pp 81-94.

European Central Bank, 2010, 'The ECB's response to the financial crisis', *ECB Monthly Bulletin*, October 2010, pp 59-74.

European Central Bank, 2011a, *The implementation of monetary policy in the Euro area: General documentation on Eurosystem monetary policy instruments and procedures*, Frankfurt am Main.

European Central Bank, 2011b, *The monetary policy of the ECB*, Frankfurt am Main.

European Central Bank, 2012, 'Financial reporting in the Eurosystem', *Monthly Bulletin*, pp 87-99, April 2012.

European Central Bank, 2015, 'The role of the central bank balance sheet in monetary policy', *Economic Bulletin,* Issue 4/2015, pp 1-17.

European Central Bank, 2017a, 'The ECB's asset purchase programme and Target balances: monetary policy implementation and beyond', *ECB Economic Bulletin*, Issue 3, pp 21-26.

European Central Bank, 2017b, 'Which sectors sold the government securities purchased by the Eurosystem?' *Economic Bulletin,* Issue 4/2017.

Falagiarda, M and Reitz, S 2015, 'Announcements of ECB unconventional programs: Implications for the sovereign spreads of stressed Euro Area countries', *Journal of International Money and Finance*, Vol. 53, pp. 276-295.

Farmer, R E A 2013, 'Qualitative easing: a new tool for the stabilization of financial markets', *Bank of England Quarterly Bulletin*, vol. 53, no. 4, pp. 405–413.

Fawley, B W and Neely, C 2013, 'Four stories of quantitative easing', *Federal Reserve Bank of St. Louis Review*, 95(1), pp 51-88.

Febrero E, Uxó, J and Álvarez, I 2019, 'Target2 imbalances and the ECB's asset purchase programme: An alternative account', Panoeconomicsus, April, 2019, accessed on 15 October, 2019 <http://dx.doi.org/10.2298/PAN180627008F>

Federal Reserve System Board of Governors, *Financial Accounting Manual for Federal Reserve Banks*, January 2019.

Federal Reserve System Board of Governors, Statistical Release H.4.1 *Factors affecting reserve balances of depository institutions and condition statement of Federal Reserve Banks*, Release Dates: December 27, 2007; December 29, 2008; December 31, 2009; December 30, 2010; December 29, 2011; December 27, 2012; December 26, 2013; December 29, 2014; December 31, 2015; December 29, 2016;

Filardo, A and Yetman, J 2011, 'Key facts on central bank balance sheets in Asia and the Pacific', BIS Papers chapters, in Bank for International Settlements (ed.), *Are central bank balance sheets in Asia too large*?, vol, 66 pp 10-29.

Filardo, A and Yetman, J 2012, 'The expansion of central bank balance sheets in emerging Asia: what are the risks?' *BIS Quarterly Review*, June 2012, pp 47-63.

Floden, M 2016, 'The Riksbank's bond purchases affect government finances', Speech at the West Sweden Chamber of Commerce, Göteborg, transcript *Sveriges Riksbank,* 09 November.

Fukui, T 2003, 'Challenges for monetary policy in Japan', Speech to the Spring Meeting of the Japan Society of Monetary Economics, 1 June, extracts reprinted in Pringle, R 2003, *Why Central Banks need capital?*, Central Banking, vol. 14, no. 1.

Gagnon, J, Raskin, M, Remache, J and Sack, B 2011, 'Large-scale asset purchases by the Federal Reserve: did they work?' Federal Reserve Bank of New York, *Economic Policy Review*, May 2011.

Garreth, R 2015, 'Understanding the central bank balance sheet' *Centre for Central Banking Studies*, Bank of England, London.

Giannone, D, Lenza, M, Pill, H and Reichlin, L 2011, 'Non-standard monetary policy measures and monetary developments' *ECB Working Paper*s, no. 1290 January.

Goodfriend, M 2000, 'The role of a regional bank in a system of central banks', *Federal Reserve Bank of Richmond Economic Quarterly*, vol. 86/1 Winter 2000.

Goodfriend, M 2011, 'Central banking in the credit turmoil: an assessment of Federal Reserve practice', *Journal of Monetary Economics*, 58 (2011), pp 1-12.

Goodhart, C A E (ed.) 2000, *Which lender of last resort for Europe?* Central Banking Publications, London.

Goodhart, C A E 2017, 'A central bank's optimal balance sheet size?' *Centre for Economic Policy Research Discussion Papers*, DP12272, London.

Greenwood, R and Vayanos, D 2008, 'Bond supply and excess bond returns', *NBER Working Paper*, No. w13806.

Gros, D 2012, 'The Big Easing', *Centre for European Policy Studies*, Commentary, Brussels, 12 April.

Gros, D, Alcidi, C and Giovanni, A 2012, 'Central banks in times of crisis: the Fed versus the ECB', *European Parliament, Director General for Internal Policies*, IP/A/ECON/NT/2012-04, accessed on 1 December 2013, <http://www.europarl.europa.eu/studies>

Grossi, G, Mori, E and Bardelli, F 2014, 'From consolidation to segment reporting in local governments: accountability needs, accounting standards, and the effect on decision-makers' *Journal of Modern Accounting and Auditing*, 10(1), pp32-46.

Hamilton, J D 2009, 'Concerns about the Fed's new balance sheet', in Ciorciari, J and Taylor, J B (eds.), *The road ahead for the Fed*, Hoover Institution Press, Stanford University.

Handig, M and Holzfeind, R 2007, 'Euro banknotes in circulation and the allocation of monetary income within the Eurosystem,' *Monetary Policy and the Economy*, Oesterreichische Nationalbank, Issue 1, pp 150-163.

Heinsohn, G and Steiger, O 2002, 'The Eurosystem and the art of central banking, *Studi Economici*, no.76, 2002/1, pp. 5-30.

Hendry, D F, Pagan, A and Sargan, J D 1984, 'Dynamic Specification', in Gilliches, Z and Intriligator, M. D. (eds), *Handbook of Econometrics, Vol. II*, Amsterdam, North Holland.

Hochreiter, E 2000, 'The current role of National Central Banks in the Eurosystem', *Atlantic Economic Journal*, vol. 28, issue 3, pp 300-308.

Ingram, I 2011, 'Funding models for central banks. The European Central Bank – a special case?' in S. Milton and P. Sinclair (eds.) *The capital needs of central banks*, Routledge, London pp 145-168.

Jobst, C 2011, 'A balance sheet view on Target – and why restrictions on Target would have hit Germany first', *CEPR Policy Portal*, 19 July, 2011

Jobst, C, Handig, M and Schneeberger, D 2012, 'The cross-border movement of Euro banknotes and Austria's Target2 liabilities', *Monetary Policy and the Economy*, Oesterreichische Nationalbank, issue 4, pp 32-52.

Jobst, C, Handig, M and Holzfeind, R 2012, 'Understanding Target2: The Eurosystem's Euro payment system from an economic and balance sheet perspective', *Monetary Policy and the Economy*, Oesterreichische Nationalbank, issue 1, pp 81-91.

Joyce, M, Lasaosa, A, Stevens, I and Tong, M 2011, 'The financial market impact of quantitative easing in the United Kindgom', *International Journal of Central Banking*, vol.3, no 3, pp 113-161.

Kachur, I, Lepushynskyi, V and Zammit, R 2016, 'The NBU's balance sheet: before, during and after the crisis', *Visnyk of the National Bank of Ukraine*, issue 237, pp 6-19, September.

Kiss, G D and Balog, E 2018, 'Conventional and unconventional balance sheet practices and their impact on currency stability', *International Journal of Monetary Economics and Finance*, Inderscience Enterprises Ltd, vol. 11(1), pp 76-94

Krsnakova, L and Oberleithner, M 2012, 'How Euro banknotes in circulation affect intra-Eurosystem balances', *Monetary Policy and the Economy* Oesterreichische Nationalbank, issue 1 , pp 70-80.

Kondratenko, V and Kostadinoska-Miloseska, S 2017, 'Anti-crisis role of the monetary policy in the new European union member states', *Economic Develop ment* no. 1-2 pp 167-180.

Koning J P 2012, 'The idiot's guide to the Federal Reserve interdistrict settlement account', accessed on 15 May 2013, <https://jpkoning.blogspot.com/2012/02/idiots-guide-to-federal-reserve.html>

Lenza, M, Pill, H and Reichlin, L 2010, 'Monetary policy in exceptional times', *Working Paper Series*, no 1253, European Central Bank, October 2010.

Martinez-Resano, J R 2004, 'Central bank financial independence', *Occasional Paper*, no. 0401, Bank of Spain.

Mayer, T 2012, *Europe's unfinished currency: the political economics of the Euro*, Anthem Press, London.

Merler, S and Pisani-Ferry, J 2012, 'Sudden stops in the Eurozone', *Bruegel Policy Contribution*, Issue 2012/06, March 2012.

Mercier, P and Papadia, F (ed.) 2011, *The concrete Euro – implementing monetary policy in the Euro area*, Oxford University Press,

Micossi, S 2015, 'The monetary policy of the European Central Bank (2002-2015)', *Bruges European Economic Policy Briefings*, 35, European Economic Studies Department, College of Europe.

Mishkin, F S 2011, 'Over the cliff: from the subprime to the global financial crisis', *Journal of Economic Perspectives*, vol. 25, no 1, Winter 2011, pp 49-70.

Moro, B 2015, 'The European crisis and the accumulation of TARGET2 imbalances' University of Cagliari, Italy.

Nagel, J 2012, 'Understanding central bank balance sheets', *The Magazine of International Economic Policy*, 26(3), pp 14-54, August.

Nickell, S 1981, 'Biases in dynamic models with fixed effects', *Econometrica*, vol. 49, issue 6, pp 1417-26.

Official Journal of the European Union, *Decision of the European Central Bank on the issue of euro banknotes,* ECB/2010/29, L35/26, 9 February 2011.

Official Journal of the European Union, *Decision of the European Central Bank on the issue of the ECB's capital,* ECB/2010/26, OJ 11/53.

Official Journal of the European Union, *Guideline of the European Central Bank* 2016/2249, 3 November, 2016, ECB/2016/34, OJ L347 p3.

Ortiz, G 2009, 'Issues in the Governance of Central Banks', *A report from the Central Bank Governance Group*, Bank of International Settlements.

Pasaogullari, M 2015, 'Unconventional monetary policy measures and inflation expectations', *Economic Commentary, Federal Reserve Bank of Cleveland*, Issue June.

Pattipeilohy, C 2013, 'A descriptive analysis of the balance sheet and monetary policy of De Nederlandsche Bank: 1900-1998 and beyond', *DNB Occasional Studies*, 1103, Netherlands Central Bank.

Pattipeilohy, C 2016, 'A comparative analysis of developments in central bank balance sheet composition', *BIS Working Papers*, no. 559, Bank for International Settlements.

Pattipeilohy, C, van den End, W, Tabbae, M, Frost, J and de Haan, J 2013, 'Unconventional monetary policy of the ECB during the financial crisis: An assessment and new evidence', *DNB Working Paper*, no. 381.

Peersman, G 2011a, 'Macroeconomic consequences of different types of credit market disturbances and non-conventional monetary policy in the Euro area', Meeting Papers, 333, Society for Economic Dynamics.

Peersman, G 2011b, 'Macroeconomic effects of unconventional monetary policy measures in the Euro Area', *ECB Working Papers*, no. 1397, November.

Perera, A, Ralston, D and Wickramanayake, J 2013, 'Central bank financial strength and inflation: is there a robust link?' *Journal of Financial Stability*, vol. 9, no. 3, pp 399-414, September. DOI:10.1016/j.jfs.2013.06.005.

Pesaran, M and Smith, R 1995, 'Estimating long-run relationships from dynamic heterogeneous panels', *Journal of Econometrics*, Elsevier, vol. 68(1), pp 79-113, July.

Pesaran, M and Smith, R 1997, 'Dynamic linear models for heterogeneous panels', *Cambridge Working papers in Economics*, 9503, Faculty of Economics, University of Cambridge.

Potter, S 2017, 'Implementing monetary policy with the balance sheet', Keynote remarks at the ECB Workshop on 'Money markets, monetary policy implementation and central bank balance sheets', Frankfurt am Main, transcript *Federal Reserve Bank of New York*, 6 November.

Reis, R 2013, 'The mystique surrounding the central bank's balance sheet, applied to the European crisis', *American Economic Review Papers and Proceedings*, vol. 103(3), pp 135-140, May.

Rodriguez, C and Carrasco, C A 2014, 'ECB policy responses between 2007 and 2014: a chronological analysis and a money quantity assessment of their effects', *Working Paper Series*, no. 65, Financialisation, Economy, Society and Sustainable Development (FESSUD) Project.

Rule, G 2015, 'Understanding the central bank balance sheet', *Centre for Central Banking Studies,* Handbook 32, Bank of England, London.

Santis, S, Grossi, G and Bisogno M 2018, 'Public sector consolidated financial statements: a structured literature review', *Public Budgeting, Accounting and Financial Management* Vol.30 No. 2, pp. 230-251.

Santor, E and Suchanek, L 2013, 'Unconventional monetary policies: evolving practices, their effects and potential costs', *Bank of Canada Review*, Bank of Canada, vol. 2013 (Spring) pp 1 -15.

Schoenmaker, D 2000, 'What kind of financial stability for Europe?' in Goodhart, C A E (ed.), *Which lender of last resort for Europe?* Central Banking Publications, London, pp. 213-223.

Schuiling, A 2017, 'Target2 balances a ticking time bomb?' *Group Economics, Financial Market Research*, ABN AMRO, 18 May, accessed on 16 July 2018, <https://insights.abnamro.nl/en/2017/05/eurozone-watch-target2-balances-a-ticking-time-bomb/>

Seikmann, H 2019, 'The asset purchase programmes of the ESCB – an interdisciplinary evaluation' *IMFS Working Paper Series*, no. 134, Institute for Monetary and Financial Stability (IMFS), Goethe University Frankfurt.

Sibert, A 2014, 'Non-standard monetary policy measures and the development of ESCB balance sheet in comparison to the Fed and the Bank of England', *European Parliament, Director General for Internal Policies*, IP/A/ECON/2014-02, accessed on 15 December 2015, <http://www.europarl.europa.eu/studies>

Sinclair, P and Milton, S (eds.) 2011, *The capital needs of central bank*, Routledge, London.

Sinn, H W 2011a, *The ECB's secret bailout strategy*, Project Syndicate, 29 April, accessed on 5 January 2013, <https://www.project-syndicate.org/commentary/the-ecb-s-secret-bailout-strategy?barrier=accesspaylog>

Sinn, H W 2011b, *The ECB's stealth bailout*, CEPR Policy Portal, 1 June, accessed on 10 May 2013, <https://voxeu.org/article/ecb-s-stealth-bailout>

Sinn, H W 2012, *Fed versus ECB: how Target debts can be repaid*, CEPR Policy Portal, 10 March, accessed on 12 May 2013, < https://voxeu.org/article/fed-versus-ecb-how-target-debts-can-be-repaid>

Sinn, H W and Wollmershäuser, T 2011, 'Target loans, current account balances and capital flows: the ECB's rescue facility', *National Bureau for Economic Research,* Working Paper, no. 17626.

Soederhuizen, B and Arnold, I J M 2017, 'A disaggregated analysis of central bank balance sheets: a tale of two currency unions', accessed on 1 October 2019, <file:///C:/Users/User/OneDrive/PhD%20Full%20Draft/Arnold%20may2017.pdf>

Steele, G R 2011, 'The ECB cannot hold back the tide of Euro credit and banknotes,' Institute of Economic Affairs Blogpost, November, accessed on 17 July 2017, <https://iea.org.uk/blog/the-ecb-cannot-hold-back-the-tide-of-euro-credit-and-banknotes>

Steinkamp, S and Westermann, F 2012, 'On creditor seniority and sovereign bond prices in Europe,' *CESifo Working Paper Series*, no. 3944, accessed on 5 October 2014, <https://ssrn.com/abstract=2155605>

Stella, P 1997, 'Do central banks need capital?' *International Monetary Fund Working Paper*, no. 83, WP/97/83.

Stella, P 2005, 'Central bank financial strength, transparency, and policy credibility', *International Monetary Fund Staff Papers*, vol. 52, no. 2, pp 335-365.

Stella, P 2009, 'The Federal Reserve System Balance Sheet: What happened and why it matters', *International Monetary Fund Working Pap*ers, WP/09/120.

Stella, P 2011, 'Central bank financial strength and macroeconomic policy performance', in S. Milton and P. Sinclair (eds.) *The capital needs of central banks*, Routledge, London.

Stella, P and Lonnberg, A 2008, 'Issues in central bank finance and independence, *International Monetary Fund Working Pap*ers, WP/08/37.

Storbeck, O 2011, 'The stealth bailout that doesn't exist: debunking Hans-Werner Sinn', *CESifo*, June.

Timmer, Y 2014, 'Target2 balances and the adjustment of capital flows in the Euro Area', Trinity College Dublin, Dublin.

Tornell, A 2012a, 'Target2 imbalances and the dynamic tragedy-of-the-commons in the Eurozone,' *UCLA*, September, accessed on 13 January 2013, <http://www.econ.ucla.edu/people/papers/Cheung/Cheung530.pdf

Tornell, A 2012b, 'The Eurozone and Target2: the sudden-stop that wasn't,' *UCLA*, December.

Tornell, A 2013, 'The Tragedy of the Commons in the Eurozone and Target2', preliminary version, accessed on 5 December 2013 <http://www.econ.ucla.edu/people/papers/Tornell/Tornell532.pdf>

Tornell, A and Westermann, F 2011, 'Eurozone crisis, act two: has the Bundesbank reached its limit?' VoxEU, 6 December, accessed on 13 January 2013, <https://voxeu.org/article/eurozone-crisis-act-two-has-bundesbank-reached-its-limit>

Tornell, A and Westermann F, 2012, 'The Tragedy of the Commons at the European Central Bank and the Next Rescue', VoxEU, 22 June, accessed on 17 May 2014, <https://voxeu.org/article/tragedy-commons-european-central-bank>

Ulrich, B and Koenig, P 2012, 'TARGET2 and the European sovereign debt crisis', *Credit and Capital Markets*, vol. 45(2), pp 135-174.

Ulrich, B, Cour-Thimann, P and Koenig, P 2012, 'Target2 and cross-border interbank payments during the financial crisis', *CESinfo*, Forum 13 Special Issue-January, pp 83-92.

Vayanos, D and Vila, J L 2009, 'A preferred-habitat model of the term structure of interest rates', *NBER Working Papers*, no. w15487, November 2009.

Vujcic, B 2017, 'The changing composition of central bank balance sheets', *Central Banking*, accessed on 5 March 2018, <https://www.centralbanking.com/central-banks/monetary-policy/3271431/the-changing-composition-of-central-bank-balance-sheets>

Weidmann, J 2016, Opening Speech at the Deutsche Bundesbank's third Cash Symposium, Deutsche Bundesbank, Frankfurt am Main, 13 June, accessed on 5 April 2017, <https://www.bis.org/review/r160621b.htm>

Weidmann, J 2017, *Introductory comments at the financial statements press conference 2016*, Deutsche Bundesbank, Frankfurt am Main, 23 February, accessed on 9 December 2018, <https://www.bis.org/review/r170224b.htm>

Whelan, K 2011, 'Professor Sinn misses the Target', VoxEU, 9 June, accessed on 4 September 2013, <https://karlwhelan.com/>

Whelan, K 2012a, 'Target2 and the Euro crisis', Presentation at Bank of England's Centre for Central Banking Studies June 26, 2012.

Whelan, K 2012b, *TARGET2: not why Germans should fear a Euro breakup*, CEPR Policy portal, 29 April, accessed on 4 September 2013, <https://voxeu.org/article/target2-germany-has-bigger-things-worry-about>

Whelan, K 2014, 'Target2 and Central Bank Balance Sheets', *Economic Policy*, January, pp. 79-137, accessed on 20 September 2015, <https://www.karlwhelan.com/Papers/T2Paper.pdf>

Whelan, K 2017, 'Should we be concerned about Target balances?' *European Parliament, Director General for Internal Policies*, Monetary Dialogue, IP/A/ECON/2017-04.

Whelan, K 2019, 'The Euro at 20: successes, problems, progress and threats', University College Dublin, June 2019.

Whelan, K and Ellen, R 2019, 'Quantitative easing and the hot potato effect: evidence from Euro Area banks', *Working Papers 201901,* School of Economics, University College Dublin.

Whittaker, J 2011a, 'Intra-Eurosystem debts', Lancaster University Management School, 30 March, accessed on 15 September 2015, <https://ssrn.com/abstract=1836470>

Whittaker, J 2011b, 'Eurosystem debts, Greece, and the role of banknotes,' *Monetary Research*, Lancaster University Management School, November, <https://www.lancaster.ac.uk/staff/whittaj1/eurosystemNov2011.pdf>

Woodford, M 2011, 'Comment', NBER Macroeconomics Annual 25(1), pp 193-204.

Woodford, M 1995, 'Price level determinacy without control of a monetary aggregate', *Carnegie-Rochester Conference Series on Public Policy* 43, pp 1-46.